Temiskaming and Northern Ontario Railway Commission

THE MINING INDUSTRY

In that Part of

NORTHERN ONTARIO

Served by the

Temiskaming and Northern Ontario Railway

ONTARIO GOVERNMENT RAILWAY

HON. W. H. HEARST, PREMIER

COMMISSION:

J. L. ENGLEHART, Chairman
DENIS MURPHY GEO. W. LEE
A. J. McGEE, Sec.-Treas.

(Appendix to Annual Report Temiskaming and Northern Ontario Railway Commission)

CALENDAR YEAR 1914

By ARTHUR A. COLE
Mining Engineer

PRINTED BY ORDER OF
THE LEGISLATIVE ASSEMBLY OF ONTARIO

LOGIN STORAGE

TORONTO:
Printed and Published by L. K. CAMERON, Printer to the King's Most Excellent Majesty
1915

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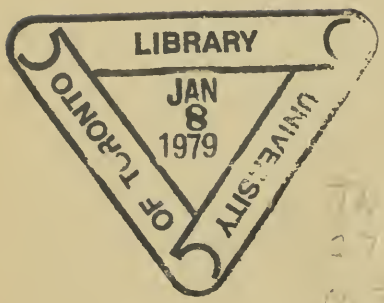

Printed by
WILLIAM BRIGGS,
29-37 Richmond Street West
TORONTO.

To His Honour John Strathearn Hendrie, C.V.O., a Lieutenant-Colonel in the Militia of Canada.

Lieutenant-Governor of the Province of Ontario.

May it Please Your Honour:

The undersigned has the honour to present to Your Honour Report of the Mining Engineer of the Mining Industry in that part of Northern Ontario served by the Temiskaming and Northern Ontario Railway for the calendar year 1914.

Respectfully submitted,

F. G. Macdiarmid,

Minister of Public Works.

Hon. Finlay G. Macdiarmid,

Minister of Public Works,

Toronto.

Sir,—I have the honour, by direction, to submit to you, Report of the Mining Engineer on the Mining Industry, in that part of Northern Ontario served by the Temiskaming and Northern Ontario Railway, for the calendar year 1914.

I have the honour to be,

Sir,

Your obedient servant,

A. J. McGee,

Secretary-Treasurer.

TEMISKAMING AND NORTHERN ONTARIO RAILWAY COMMISSION

J. L. ENGLEHART, Chairman.

DENIS MURPHY, Commissioner.

GEO. W. LEE, Commissioner.

A. J. McGEE, Secretary-Treasurer.

A. A. COLE, Mining Engineer.

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Silver Bullion Shipped by Nipissing Mining Co., Ltd., Cobalt, Ont., 25th February, 1914; 381 bars containing 453,213 oz. Troy, or 15½ tons Avoirdupois. Value, $260,681.16.

GENERAL

The year 1914 is marked by many abnormal conditions, and these are seen in mining as well as in other industries.

In the first half of the year the gold industry showed steady progress at both Porcupine and Kirkland Lake. The silver output, however, at Cobalt continued to fall off, owing primarily to the natural decline in production, but this was accentuated by a gradual fall in the price of silver, the average price for July being 54.678 cents, or 5 cents below the average price for 1913.

On the outbreak of the war it looked as if both gold and silver output would, as a direct consequence, be much curtailed. This eventuality has happily been avoided. The call for gold had the effect of stimulating the gold mining industry in the case of producing mines, but it was different with silver mining.

During the first days of the war the mines that produced silver bullion and could get it to London received satisfactory returns owing to the heavy buying for coinage purposes at that time and the abnormal foreign exchange which was in their favor. Very soon, however, London silver quotations were suspended, and as a consequence, the same thing happened in New York, as all quotations are based on the London price. Much uneasiness was felt for some weeks and a few of the mines at Cobalt closed down, while almost all curtailed their output. When quotations were resumed in London it was only on consignments that were actually on hand in London at the time of the sale. The mines that produce their own bullion were in an advantageous position, as they were able to dispose of their output if they were willing to accept the low price ruling for silver.

The smelters at first would only accept ore from the mines with which they had contracts, and even then, as most of their contracts were dependent on the New York price, of which there was none at the time, new arrangements had to be made. For awhile this arrangement was either to pay the mine about eighty per cent. of what was considered the value of the silver, leaving the final adjustment to be made when the silver could be sold, or to return to the mine the silver bullion recovered, charging only for the treatment of the ore.

Application was made to the Dominion Government and arrangements were made whereby the banks could take security on bullion, which could be held by them, or by what might be termed warehousemen. It was further arranged that should any bank find itself called upon to use its assets to too large an extent for what this one class of business might warrant, it would lodge the bullion with the Government and obtain a certain proportion of the value of the security by way of a loan to the bank to offset the original advance. The unsatisfactory feature of this arrangement appears to be the strong objection of any of the banks in Canada to take any unsual action in their financing, that the public may become aware of, owing to the unwarranted rumors that become prevalent thereby.

As a matter of fact, this expedient was not required. Except for a short time soon after the outbreak of hostilities there has been no actual difficulty in disposing of the silver so long as the seller would take the market price. Although the price continued low those mines that closed down in August gradually resumed operations till at the end of the year all were again working, though the output in many cases is still restricted.

Apart from the market there were certain commodities required for the treatment of gold and silver ores, which were ordinarily obtained from Europe, but of which the supplies were threatened on account of the war. These were cyanide, zinc dust and pebbles.

CYANIDE.—It was feared that those mines using cyanide might have to curtail their output, because much of the world's production of cyanide was of German manufacture, the buying of which is now contrary to the laws of Canada. As a matter of fact, it was found on inquiry that all the mines of this district, with two exceptions, were using cyanide manufactured in Great Britain by the Cassel Cyanide Company, Limited, of Glasgow, Scotland.

The British Government, realizing the importance of the production of gold and silver, particularly at the present time, asked the Cassel Company to sell no cyanide outside the British Empire until the gold and silver mines within the Empire had been supplied.

Following this programme, therefore, the Cassel Cyanide Company sent a special representative into Northern Ontario to confer with the mine managements. The company is making large additions to its present plant so as to be able to carry its increased production load, but it will be a number of months before these can be completed.

The following extract taken from the *Times* of 9th December, 1914, gives in part the report of Mr. D. S. Carson, Chairman, at the Annual Meeting of the Cassel Company:—

"As to general prospects, since the outbreak of the war all departments had been working at high pressure. Their manufacturing and financial resources had enabled them to overtake an important shortage of cyanide on the Rand occasioned by the cessation of shipments from Germany. Failure on their part to do so would have meant a curtailment of mining operations in South Africa and a serious decrease in the amount of gold available for the Bank of England, and consequently for the prosecution of the war. While many industries were suffering at this time through lack of products of which Germany had a monopoly, it was satisfactory to know that there was more than enough cyanide being manufactured in the United Kingdom to-day to meet legitimate demands within the British Empire."

Owing to increased cost of raw materials, due directly or indirectly to the war, the price of cyanide has risen to 18 cents per pound, which is a rise of three cents above the price immediately before the war.

The offer that the Cassel Cyanide Company is now making to the mines is to keep them supplied with cyanide on the following terms: 18 cents per pound to June, 1915; 16 cents per pound to the end of 1916; and 15 cents, or the normal price, during 1917, providing that the mines on their part will give the company an exclusive cyanide contract for two years, giving an estimate now of what their requirements are likely to be during that time.

The mining companies now using cyanide in the district are:—

Cobalt—
- Buffalo.
- Dominion Reduction.
- Nipissing.
- O'Brien.

Porcupine—
- Dome.
- Hollinger.
- McIntyre.
- Porcupine Crown.
- Vipond.

To these will likely be added in 1915:—

Cobalt—Cobalt Reduction.

Kirkland Lake—Tough Oakes.

Porcupine—Schumacher.

The normal monthly consumption of cyanide in the district is about 50 tons in Cobalt and 20 tons in Porcupine. This may be expected to gradually increase till the consumption a year from now should run over 100 tons per month, an amount which is almost half the 1913 consumption of the United States.

Zinc Dust.—Since the outbreak of war the zinc dust situation has also been creating some uneasiness. Before August last, the main supplies came from Belgium and Silesia, but these being cut off, the mines now have to look to the United States.

The Belgian price was 6¾ cents, but now the price is 11 cents f.o.b. Cobalt. The method of preparation adopted in the United States is different from that of the Belgian furnaces, the American product carrying a slightly higher percentage of oxide and more lead, and therefore having a proportionately smaller precipitating power.

Pebbles.—The supply of pebbles for pebble-mills formerly came from Denmark and France. Shipments from these points are now practically cut off, but an adequate supply can be obtained from Newfoundland and Sweden. A consignment of 1,200 tons of pebbles was recently brought in from Newfoundland.

The European pebbles are flint, but those from Newfoundland are a greywacké. The following is the report on a microscopic analysis of a Newfoundland pebble made at the Bureau of Mines, Toronto:—

"Name—Greywacké. Microscopically the slide consists of about sixty-five per cent. of angular and sub-angular quartz grains, five per cent. of angular feldspar fragments with masses of chlorite ten per cent., and sericite five per cent., set in a fine ground mass of chlorite, sericite and quartz. Much kaolin and some pyrite, iron oxide, sphene and apatite are present."

At the close of the year (1914) the price per ton of pebbles was $21.17 at Cobalt and $21.69 at Porcupine—practically the same price as before the war. The annual consumption of pebbles is about 600 tons for Cobalt and 1,400 tons for Porcupine.

The mills now using pebbles in this district are:—

Cobalt—
- Beaver.
- Buffalo.
- Cobalt Lake.
- Dominion Reduction.
- McKinley-Darragh.
- Nipissing.
- O'Brien.
- Penn Canadian.

Kirkland Lake—Tough Oakes.

Larder Lake—Huronia.

Porcupine—
- Dome.
- Dome Lake.
- Hollinger.
- McIntyre.
- Porcupine Crown.
- Vipond.

GOLD

The effect of the war on the gold camps has been to stimulate production from the already producing mines, but where more capital was required, as for prospecting and early development, most work was curtailed.

The gold production from Porcupine is shown in the following tables:

PORCUPINE GOLD PRODUCTION, 1914.

Mines and Mills.	Tonnage Milled.	Bullion Ounces.	Value.
			$ c.
Acme	2,910	1,500.00	31,000 00
Dome	221,390	51,016.12	1,054,503 24
Dome Lake	1,638	556.00	8,832 32
Hollinger	208,936	134,000.00	2,688,354 80
Porcupine Crown	40,857	57,513.00	671,177 06
Porcupine Pet	1,433	580.40	8,264 00
Rea	11,607	6,444.00	125,000 00
McIntyre	62,209	27,500.00	549,583 00
Vipond	9,559	3,217.95	66,514 58
	560,539	282,327.47	5,203,229 00

PORCUPINE GOLD PRODUCTION, 1910-1914.

Year.	Ore Treated.	Gold Bullion.	Value.
	(Tons.)	(Ozs.)	$
1910	1,060	1,947	35,539
1911	707	851	17,187
1912	.....	83,726	1,730,628
1913	.....	207,583	4,284,928
1914	560,539	282,327	5,203,229
	562,293	576,434	11,271,511

There were two other gold producers outside of Porcupine, viz.:

Tough Oakes at Kirkland Lake and the La Mine d'Or Huronia near Larder Lake.

Promising prospects were found during the year near Sesekinika Station. Mileage 176, in the Township of Maisonville. The most noteworthy were the Smith and Labine, the Sullivan and the Malouf claims. The veins show patches rich in gold, associated with certain tellurides, and although very persistent are narrow. Little more than assessment work has been done on these claims, so that the value of the district has yet to be proven.

CANADIAN MINING & FINANCE CO., LTD.

The Canadian Mining & Finance Co., Ltd., owns the Acme and Millerton properties and a controlling interest in the Hollinger. In order to reduce costs a plan of centralization is gradually being worked out. Already the same management and office staff operates these three properties.

A central shaft with six compartments (down 220 feet on 1st January, 1915) is being sunk on the Acme property near the Hollinger line. It is proposed to

Wooden Penstock and Forebay, Sandy Falls, Ont. Northern Canada Power Co., Ltd.

Waiwaiten Falls Power Development, Showing Penstock During Construction.
Northern Canada Power Co., Ltd.,

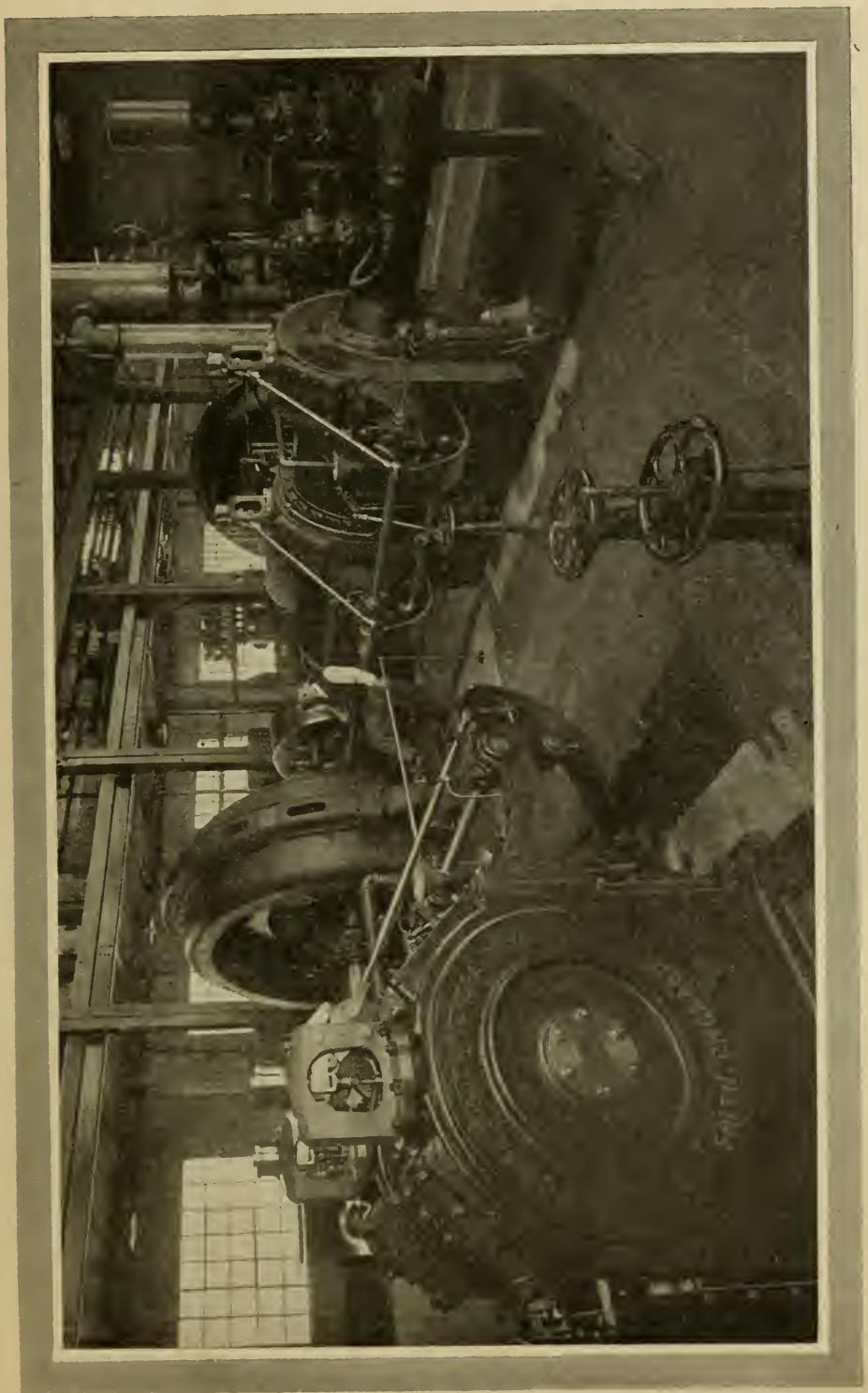
cut stations at 425 ft., 800 ft., 1,250 ft., etc., and from these levels to run haulage crosscuts to tap the workings of all three properties. Between levels the ore will be developed by sub-levels, but the ore will be dropped to the main levels for hoisting to the surface. Electric locomotives operating in the crosscuts will collect the ore from each property and deliver it at the central shaft. The ore will first pass over coarse grizzleys and through preliminary crushers, which will reduce it to a size suitable for stamping in the Hollinger Mill. It is expected that the central shaft will be in operation by the middle of 1916, but in the meantime temporary expedients will be used at the Hollinger and Acme to tide over the time required for sinking and equipping this shaft.

The original Hollinger mill was designed to treat 500 tons per day, but to this was added 20 stamps, giving it a total of 60 stamps, bringing the present tonnage up to 830 tons per day. The present Hollinger needs for milling capacity are about 1,000 tons per day, while the Acme will require 500 tons per day to be treated within a few months. To meet this growing capacity 40 stamps are being installed to treat Acme ore, and a large addition to the cyanide plant is nearing completion, half of which will be used for Hollinger ore and the other half for Acme. It is expected to have these additions in operation by the end of February, 1915.

The Canadian Mining and Finance Co., Ltd., has completed the construction of a central power plant on the south side of Gillies Lake. The building is of steel frame construction, with concrete curtain walls and roof. It is 51 feet wide x 120 feet in length, and is designed to accommodate four compressors each of 4,500 cu. ft. of free air per minute capacity. Three compressors are now in commission, with space left for an additional unit. One compressor, designed and built by Fraser & Chalmers, of London, England, is of special design, being fitted with Hoerbiger valves of variable volume gear of the Doerfel type, which automatically adjust the output of the machine to the exact requirements of the demand for air, thus doing away with peak loads and thereby reducing the cost of power, which is purchased upon a basis of peak loads. The cylinders are 22½″ x 38″ x 30″ stroke. The speed is 125 r.p.m. This machine has a complete range of capacity from zero to full load, automatically controlled by suitable governor gear. The other two compressors were designed and built by the Nordberg Manufacturing Company, of Milwaukee, Wis. They are designed to run at full load continuously, and have no variable volume gear, the cylinders are 22″ x 37″ x 31″ stroke. The valves are Corless and the speed is 125 r.p.m. These compressors possess the unique advantage of being reversible; thus in the event of an interruption to the supply of electric power they may be operated as steam engines and their motors may be driven as generators of electric power. The supply of steam for this purpose can be obtained from a battery of four Wickes vertical water tube boilers, each having 3,000 sq. ft. of heating surface and connected through suitable breeching to an induced draft fan which enables the boilers to be run at a high overload during such time as the compressor plant is being used as an auxiliary steam driven electric power plant.

In addition to the usual intercoolers each compressor is equipped with a Fraser & Chalmers vertical aftercooler, each having 1,100 sq. ft. of cooling surface and so designed that the tubes and tube plates can be lifted out of the cooler shell for cleaning.

The boiler house is built on the east end of the compressor building and is of the same type of construction. It accommodates the electrically driven pumps for mill water. A concrete intake and suction well has been built to insure a liberal supply of clean water at all seasons of the year.



Air Compressor Plant, Canadian Mining & Finance Co., Ltd., Timmins, Ont.

Hollinger Gold Mines, Limited.

The following notes on the Hollinger Gold Mines, Ltd., are taken from the fourth Annual Report of the company covering operations for the year 1914:—

RECORD.

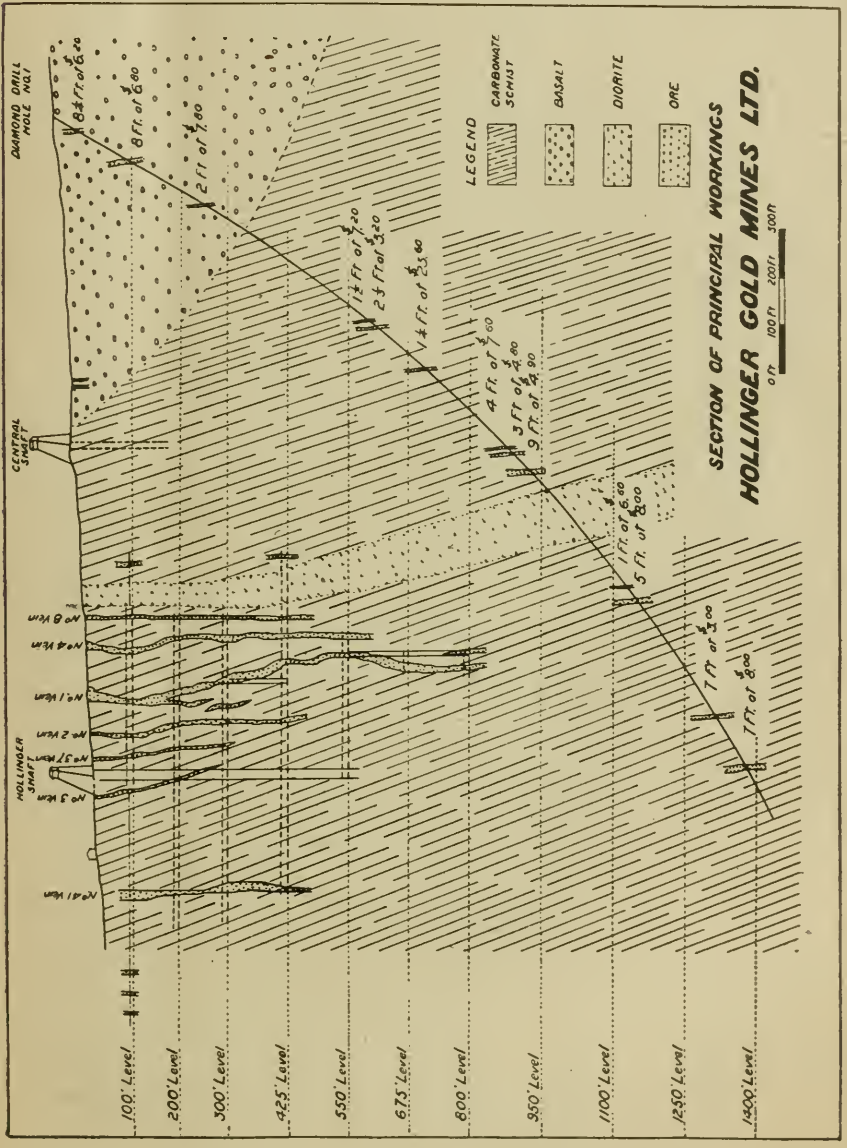
Year.	Tons of Ore Milled.	Values Recovered.	Dividends Paid.
		$ c.	$
1911	1,000	46,082 52	.....
1912	45,195	933,682 00	270,000
1913	138,291	2,466,220 24	1,170,000
1914	208,936	2,688,354 80	1,170,000
Totals	393,422	6,134,339 56	2,610,000

The year has been a successful one for the company and in the words of Mr. P. A. Robbins, the manager, there have been no disappointments of any kind in the mine during the past year, and it is expected that the present year will show continued improvement in the property. Underground work was hampered during a greater part of the year by an insufficiency of compressed air for operating drills, but better progress has been made since November, when the new air plant of the Canadian Mining & Finance Co. was put into operation.

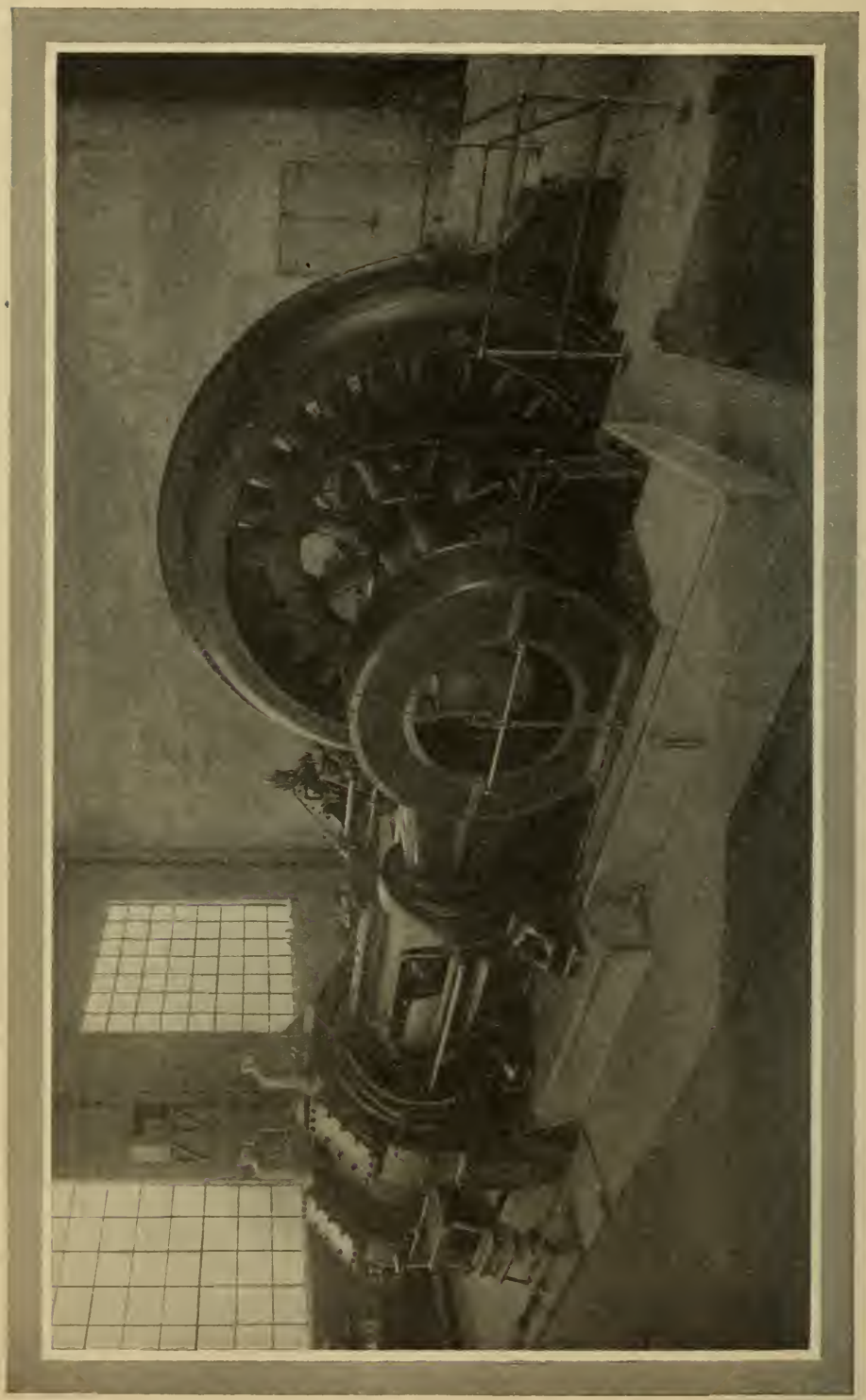
The 800-foot level has been reached and the No. 1 Vein has been found to persist to that level. The main shaft has been carried down to 550-feet and will be continued to 800-feet during the present year. The levels below 800-feet will be opened up from the new central shaft of Canadian Mining & Finance Co. Ltd., although it is possible that a winze may be sunk below 800-feet before the Central Shaft workings reach the Hollinger ore bodies.

On December 31st, 1914, the ore reserves were estimated at 1,162,960 tons of an average value of $11.49 per ton, giving a gross value of $13,358,420. This estimate shows an increase of 317,660 tons of ore and an increase from $11,604,800 to $13,358,420 in gold contents as compared with the estimates made at the end of 1913. During the year the mill treated 208,936 tons, containing $2,857,397.54, which figures taken with the increase in estimated reserves show 526,596 tons containing $4,611,017.54 to have been developed during the year. The average value of the ore has fallen from $13.71 per ton to $11.49 per ton, the fall off in grade being primarily due to the development of considerable tonnages of lower grade ores. The potentialities of the property are not estimated in the estimate of ore reserves.

Fifty-four veins have been located upon the property and thus far only twelve of these have been reached by underground workings. Diamond drill holes have indicated a number of ore bodies carrying payable values which have yet to be reached by underground workings. The plate entitled "Section of Principal Workings" shows the results obtained by means of diamond drill hole



Diamond Drill Hole—Hollinger Mines.



One of three Air Compressors in Plant of Canadian Mining & Finance Co., Ltd.
Each compressor has a capacity of 4,500 cubic feet of free air per minute.

No. 1. This hole was driven to an inclined depth of 2,000 feet and when drilling was stopped had reached a vertical depth of 1,425 feet below the surface. In the course of drilling thirteen mineralized zones were passed through.

The information furnished by the drill hole is two-fold; first there is no change in rock formation to a depth of 1,425 feet; second there is no change in vein characteristics to a depth of 1,425 feet. The gold values obtained by drilling are about those which might be reasonably expected if a drill hole were to be driven through the vein system at any random point below the 200 feet level.

It is reasonable to assume that some of the ore bodies encountered in drilling are continuations of the veins being worked upon the upper levels, and such being the case, it is not unreasonable speculation to anticipate from the ore bodies now being worked, a production of something over twice the value of the ore shown in the "Estimate of Ore Reserves." Beyond this are the possibilities of production from the veins not yet developed, and also the value of ore which may be encountered at levels below the depth of the bore hole.

During the past year the number of stamps in the mill has been increased to sixty, and alterations have been made to the cyanide plant, with the net result that the capacity of the mill has been increased to 800 tons per day. The rapid development of the mine has continually demanded increased milling capacities and the decision to treat ore from the Acme and Millerton properties now makes it necessary to add considerably to the milling plant. It is expected that by the middle of February eighty stamps will be dropping, to be followed by twenty more due the middle of March.

Present milling practice adheres closely to the lines laid down in the original mill, except that the Company is now about to resort to continuous decantation for the gritty, quick settling portion of the ore, while the more flocculent portions will continue to be treated in the filter plant.

The treatment of concentrates has not yet been perfected, and these are still being stored after making a partial recovery of their contained values.

Experience in the mill indicates strongly that the best results will be obtained by separating the ore into its component parts and providing a special treatment for each.

It is anticipated that the final practice in the mill will be:

Amalgamation for Nuggets.

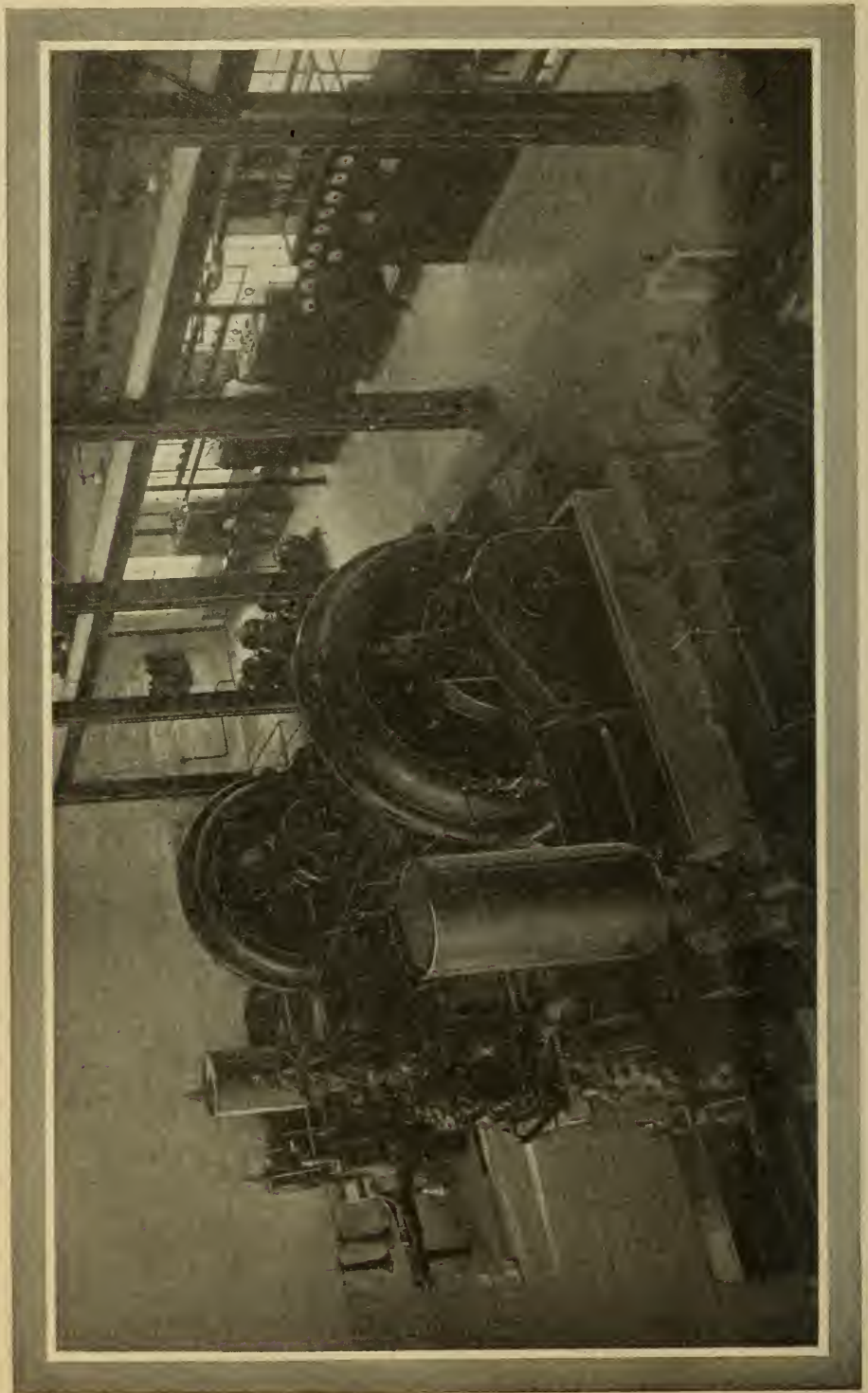
Settling or Filtration for Slimes.

Continuous decantation for Sands.

Regrinding and increased agitation for concentrates.

The working costs for 1914 were $4.421 per ton to which has been added a cost of $.792 cents to cover the amount written off plant for depreciation, thus bringing the total up to $5.213 per ton. Similar figures for 1913 were $6.11 per ton, net, and $6.97 per ton, gross costs.

During the year thirteen dividends of $90,000 each, or $1,170,000, were paid, amounting to an annual dividend of 39 per cent. The total dividends to the end of 1914 amounted to $2,610,000. The dividend was then raised to 4 per cent. per four-weekly period, and it would appear that this can be paid without any difficulty. During the year a gain of $165,271.12 was added to the quick assets of the company, giving a total of $664,603.48, and at the same time capital assets gained $288,550.49 over 1913 figures making them $456,550.49.



View showing parts of two Nordberg and one Fraser & Chalmers Compressor in plant of Canadian Mining & Finance Co., Ltd. Supplying air to Hollinger, Acme, Millerton and other mines.

The Acme Gold Mines, Limited.

The Acme Gold Mines, Ltd., is incorporated under the laws of Ontario, with a capital of $3,000,000. Its claims adjoin the Hollinger on the north-east and cover the continuation of the Hollinger vein system. The company has four shafts in operation, is carrying on development work on the 100, 200, 300, 425 and 550 ft. levels, and is sinking to reach the 800-ft. The company is owned entirely by the Canadian Mining & Finance Co. Ltd., which is a close corporation. Forty stamps in the Hollinger Mill are expected to be ready by March 1st, 1915, to handle Acme ore.

At the present time there are sixty faces developed from which ore can be taken to supply the mill without doing any stoping.

Later on extensions will be made to the Hollinger Mill to handle Millerton ores also.

Porcupine-Crown Mines Limited.

Development.

The total development for the year equals 4,633 feet made up as follows:

—	Prior to 1914	1914	Total to Date
Crosscutting	2,526 ft.	2,471 ft.	4,997 ft.
Drifting	2,104 ft.	1,674 ft.	3,778 ft.
Raising and Sinking	1,292 ft.	488 ft.	1,780 ft.
Totals	5,922 ft.	4,633 ft.	10,555 ft.

Additions have been made to the ore shoot at four levels, particularly at the 200-foot level, where a larger body of ore than any heretofore discovered has been encountered, although of medium grade. During the year, a vertical diamond drill hole was put down at a point near the eastern boundary and about 900 feet south of the northern boundary. At 275 feet the hole passed through 18 inches of vein assaying $4.00. At 1,100 feet about 20 feet of vein material was cut, but this did not show any appreciable value. The existence of the vein at this depth is encouraging although the values were unsatisfactory.

Production.

The net value of production of the property for the past year after deducting mint charges was $689,151.46.

65,198 tons of ore and 11,554 tons of waste were broken.

The excess ore broken, over milled, and on the timbers in the mine is 24,341 tons.

The mill treated 40,857 tons of ore.

Average value of Heads	**$17 18**
Average value of Tails	**0 47**
Average Extraction	**97.26%**

Milling.

The results of milling operations have been very satisfactory. The continuous decantation process has not only been justified, but has proved remarkably adapted to the ores of the Porcupine District, and with one exception has been adopted by all the important mines in the district.

The average extraction of the mill for the year was 97.26 per cent. in spite of the fact that on two occasions, once in February and once in October, carbon bearing rock caused reprecipitation of some of the gold in solution, and a resultant loss in the tails.

Practically no change has been made in the flow sheet except the installation of another agitator, which has increased the extraction by several cents per ton.

Costs of Operation.

The operating costs were materially reduced for the year.

The following is a detailed distribution of all charges and cost per ton.

Distribution of Costs.

		Cost per Ton	
		Ore Broken	Ore Milled
Mining, Development, Exploration and Underground...	$130,554 85	$2 00	$3 20
Hoisting and Tramming	16,074 33	.....	39
Mill Operation	56,621 11	.....	1 31
Power, Heat and Maintenance	61,498 55	.....	1 51
Mine General Expense	46,177 24	.....	1 12
Depreciation, Administration and Taxes	31,270 91	.....	76
	$339,196 99	.....	$8 29
Cost of 24,341 tons of ore broken but not milled and cost written off	48,682 00	.....	1 20
Cost per ton of ore milled	.....	.....	$7 09

Gross value production		$691,394 29
Mint charges		2,242 83
		$689,151 46
Mine Operation Expense		339,196 99
Mine Operation Net Profit		$349,954 47

Dividends.

Dividends have been paid by the company as follows:

1914		
April 1st	3%	$60,000 00
July 1st	3%	60,000 00
October 1st	3%	60,000 00
		$180,000 00
1915		
January 2nd	3%	60,000 00
		$240,000 00

Ore Reserves.

During the year there were added to the ore reserves 40,000 tons of a value of $297,000. This gives the property at the end of the year total ore reserves equivalent to 85,000 tons with a value of $1,510,000.

At the end of 1913, development work had apparently reached the lateral extent of the ore body, being limited on the north by the Hollinger property, and on the south by the main fault. During the first eight months of the year the development work was very discouraging both in proving the ore beyond the fault on the upper levels, and in the development at the 500-foot level. The development during the last four months, however, has not only proved the ore to exist at the 500, but has been most satisfactory south of the fault, and as a result, on one level (the 300) almost 1,000 feet of ore shoot has been developed. The vein south of the fault has not proved to be as rich as the original portion of the vein, and although practically as much tonnage has been put in sight as that extracted, the value of the new ore is not as great as that of the ore milled during the past year.

PORCUPINE CROWN

Monthly Mill

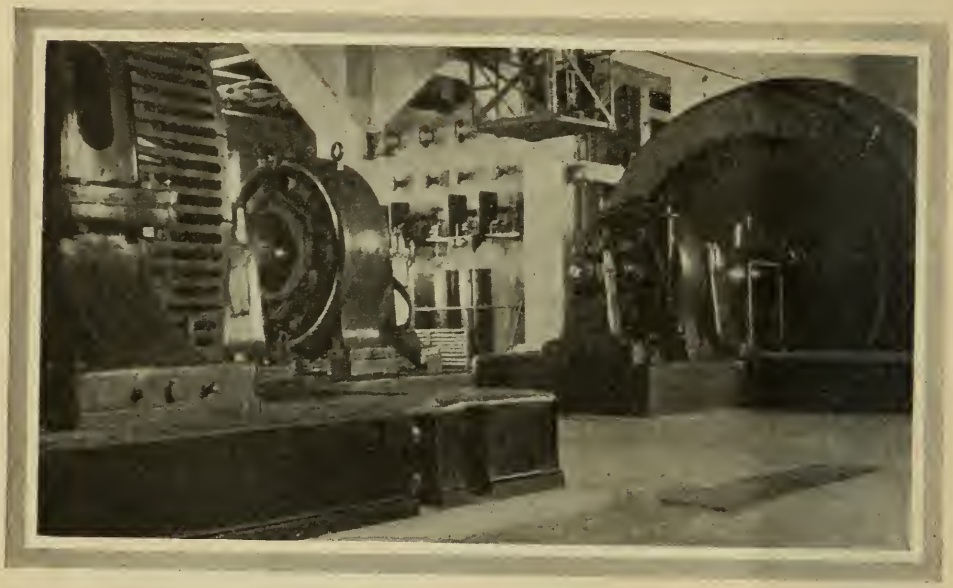
Period.	% Time Run	Av. Tons Milled per 24 hrs.	Tons Milled in month.	Tons Milled to date.	Gold produced per month.	Gold produced to date.	Gold in Tailings in month.	Gold in Tailings to date.
	%				$ c.	$ c.	$ c.	$ c.
Prior to Jan. 1, 1914.	.....	.....	.....	19,713	.....	322,853 88	.....	59,922 99
January	64.50	106.3	3,297	23,010	49,662 82	372,516 10	2,308 40	62,231 39
February	57.00	99.0	2,774	25,784	40,833 67	413,350 37	3,119 72	65,351 11
March.....	79.75	142.6	4,420	30,204	87,138 99	500,489 36	2,697 49	68,040 60
April	87.50	119.6	3,588	33,792	64,155 29	564,644 65	1,540 78	67,647 03
May.....	93.67	115.1	3,570	37,362	51,273 63	615,918 28	1,617 24	69,589 38
June	84.50	96.8	2,903	40,265	47,962 96	663,881 24	821 44	72,028 06
July.....	89.35	103.5	3,209	43,474	46,159 70	710,040 94	1,250 82	73,278 88
August.....	90.83	113.5	3,532	47,006	58,166 98	768,207 92	1,123 91	74,402 85
September....	95.19	117.9	3,536	50,542	58,241 34	826,449 26	1,171 28	75,574 13
October.....	97.54	123.8	3,839	54,381	67,869 43	894,318 69	2,330 91	77,905 04
November	89.39	106.2	3,186	57,567	65,492 82	959,811 51	946 04	78,851 08
December	79.64	97.2	3,013	60,580	45,572 12	1,005,383 63	925 38	79,776 46
1914 Totals and Hours	84.24	111.9	40,861	60,580	682,529 75	1,005,383 63	19,853 41	79,776 46

Tailings include amalgamation tailings which may be re-treated: 80% of these tailings amounts to $38,634.05. Assuming that 80% of value of amalgamation tailings may be recovered upon cyaniding the per cent. extraction to date becomes 96.20.

MINES, LIMITED.

Summary for 1914.

Gold value of Ore in month.	Gold value of Ore to date.	Monthly.			To Date.			Extraction.	
		Gold per ton Heads	Gold per ton Tails	Gold per ton recovered.	Gold per ton Heads.	Gold per ton Tails	Gold per ton recovered.	In Month.	To Date.
$ c.	$ c.	$ c.	c.	$ c.	%	%	%	%	%
.....	382,776 87	.....	.....	.....	19.41	3.03	16.38	.....	84.38
51,971 22	434,748 09	15 76	70	15 06	18.89	2.70	16.19	95.55	85.70
43,953 39	478,701 48	15 84	1 12	14 72	18.56	2.53	16.03	92.90	86.36
89,836 48	508,537 96	20 32	41	19 91	18.82	2.25	16.57	96.88	88.04
65,696 07	634,234 03	18 31	42	17 89	18.76	2.00	16.76	97.65	89.33
52,890 87	687,124 90	14 81	45	14 36	18.38	1.86	16.52	96.96	89.88
48,784 40	735,909 30	16 80	28	16 52	18.27	1.78	16.49	98.31	90.25
47,410 52	783,319 82	14 82	39	14 43	18.01	1.68	16.33	97.36	90.66
59,290 95	842,610 77	16 78	31	16 47	17.94	1.58	16.36	98.14	91.19
59,412 62	902,023 39	16 80	33	16 47	17.84	1.49	16.35	97.91	91.64
70,200 34	972,223 73	16 20	61	17 59	17.88	1.43	16.45	96.64	92.00
66,438 86	1,038,662 59	20 85	30	20 55	18.04	1.36	16.68	98.56	92.46
46,497 50	1,085,160 09	15 43	31	15 12	17.91	1.31	16.60	97.99	92.68
102,383 22	1,085,160 09	17 18	47	16 71	17.91	1.31	16.60	97.26	92.68



Interior view, showing direct connected exciters, Sandy Falls, Ont.
Northern Canada Power Co., Ltd.

Interior view, showing Wheels and Governor, Sandy Falls, Ont.
Northern Canada Power Co., Ltd.

McIntyre-Porcupine Mines, Limited.

The following is a summary of work done during the calendar year 1914:

Tons of ore broken	70,896
Tons of ore milled	62,209
Value per ton	$9 26
Bullion shipped	$549,583 00
Footage Driven.	
Shafts	209.0 feet
Drifts	4,059.55 feet
Crosscuts	1,420.60 feet
Raises	1,079.80 feet
Winzes	146.40 feet
Total	6,915.35 feet
Diamond drilling	3,294.6 feet
Average Number of Men Employed.	
Underground	95
Surface, including construction	78
Depth of Shafts.	
No. 1	300 feet
No. 2	90 feet
No. 3	90 feet
No. 4	600 feet
No. 5	400 feet

Construction.

Addition of a 150-ton unit to the cyanide mill.

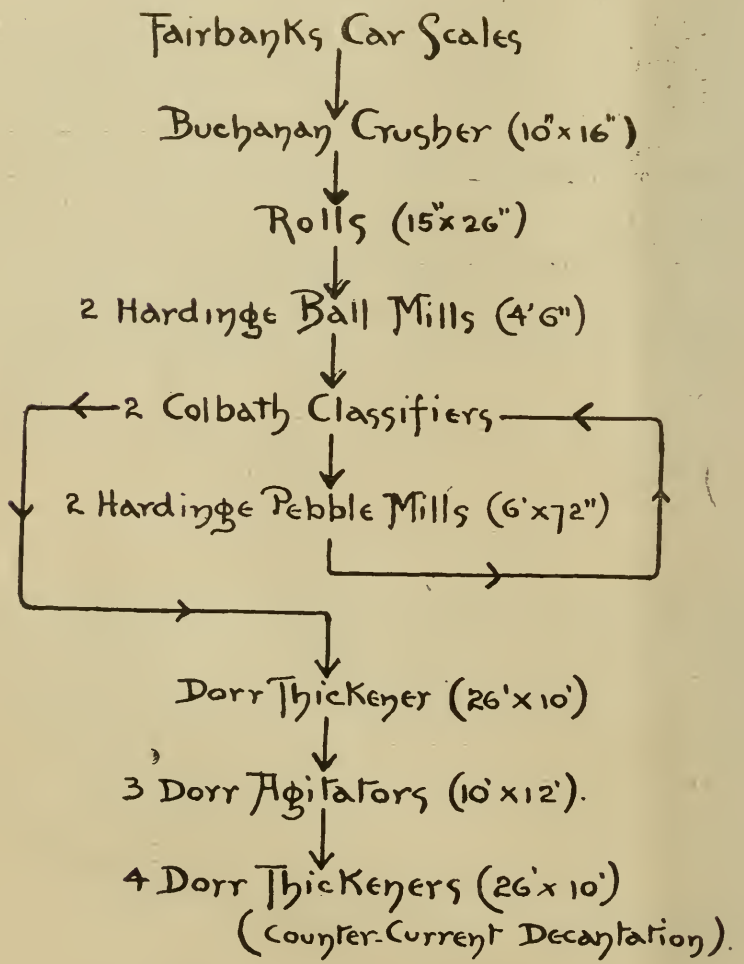
Porcupine Vipond Mines, Limited.

Underground work restarted at this mine on August 5th, 1914. A summary of the work accomplished in 1914 is as follows:

Level.	Drifts.	Cross-cuts.	Raises
	feet.	feet.	feet.
100 feet	215.8	27.5	186.4
200 "	133.5	26.4	.....
300 "	23.8	28.8	.....
Total	373.1	82.7	186.4

Total Footage to January 1, 1915.

Level.	Shafts.	Winzes.	Raises.	Cross-cuts.	Drifts.	Totals.
100 feet	.....	10.0	222.0	486.0	1,172.4	1,890.4
200 "	.....	12.0	165.0	862.0	1,190.6	2,229.6
300 "	.....	.....	.....	409.0	539.4	948.4
Shaft No. 1	323.0	.....	.....	.....	.....	323.0
	323.0	22.0	387.0	1,757.0	2,902.4	5,391.4



PORCUPINE VIPOND MILL.

Shaft No. 2 is 63 feet deep, and there is some work done at the 60 foot level, but there is no record of the amount.

The addition of a cyanide plant to the mill was started May 10th and completed on 1st September, on which latter date the complete mill was put into operation. The counter current continuous decantation system was adopted and is working very satisfactorily.

The following mill data is for the year 1914:

Tons Treated	9,559 tons	
Gold Bullion Produced	3,217.95 fine oz.	$66,514 58
Silver Bullion Produced	413.84 fine oz.	200 57
Precipitate on hand December 31st		3,758 77
Refinery slag on hand December 31st		2,304 00
Plant Absorption		1,186 00
		$73,963 92
Tailings Loss		8,309 25
Total Value of Ore Treated		$82,273 17
Average Value per Ton		$8 60
Loss per Ton		0 86
Extraction		90%

The Rea Mine.

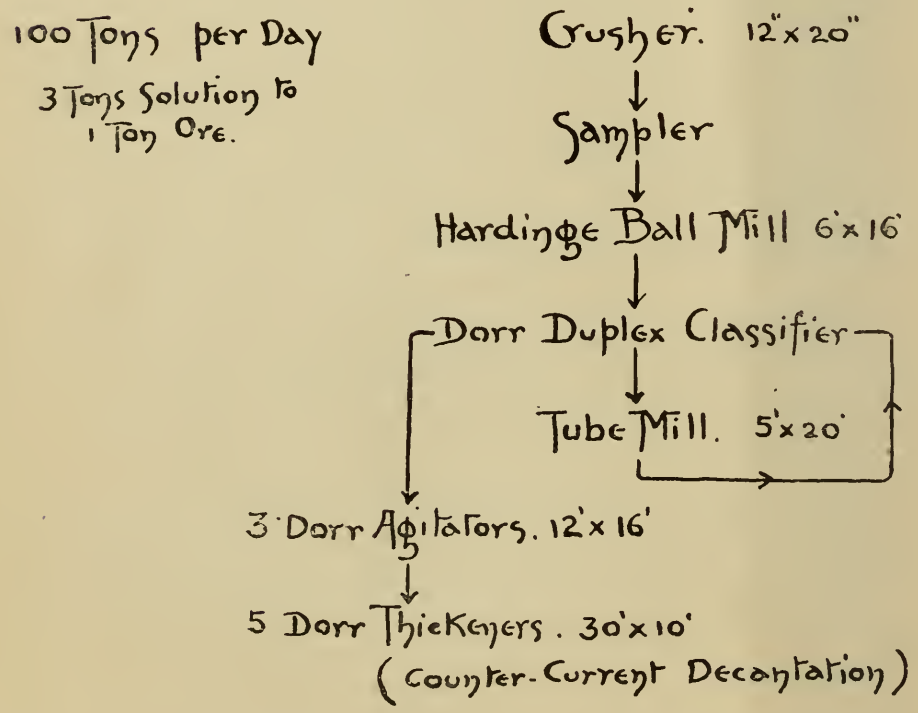
This property was operated throughout the year by a leasing company and a small mill was running regularly on ore stoped from the 200-foot level. The mill treated 11,607 tons producing 6,444 oz. of bullion valued at $125,000.

The Dome Mines Company, Ltd.

During the year 1914 development at the Dome Mines consisted of 115 feet of shaft sinking, attaining a depth of 551 feet, and 6,337 feet of cross cutting, drifting, raising, and boxholing combined. This work was almost entirely confined to the 3rd, 4th and 5th levels, while the ore was supplied mostly from the 2nd level from the open cut workings above. Diamond drill work also amounted to 5,247 feet.

The record of this mine for the past eighteen months is as follows:

Month	Tons Milled	Value Gold Produced	Value per ton
1913		$	$ c.
July	11,150	75,958	6 81
August	10,720	67,660	6 31
September	10,790	70,135	6 50
October	12,370	118,000	9 53
November	13,820	121,150	8 76
December	13,470	106,904	7 93
1914			
January	13,900	111,500	8 02
February	12,010	69,000	5 74
March	14,979	87,657	5 85
April	14,770	97,454	6 59
May	16,180	62,109	3 83
June	18,250	83,421	4 51



PROPOSED CYANIDE MILL, SCHUMACHER GOLD MINES, LIMITED.

Month	Tons Milled	Value Gold Produced	Value per ton
		$	$ c.
July	19,780	82,984	4 19
August	20,170	90,893	4 50
September	21,940	99,302	4 52
October	22,500	95,880	4 26
November	22,040	96,770	4 39
December	23,090	81,660	3 53
	291,929	$1,618,437	$5 54

The mill now treats 23,000 tons per month and is being gradually adjusted to efficiently treat 28,000 to 30,000 tons per month. The average number of men employed was:

Underground	126
Above ground	143
Construction	50

Dome Lake Mining and Milling Company.

At the Dome Lake Mine underground prospecting continued throughout the year. Towards the end of the year a small mill was started and treated 1,638 tons, producing 556 oz. of bullion valued at $8,832.32. After amalgamation the ore was run over concentrating tables and 21 tons of concentrates produced, valued at $1,482.

Porcupine Pet Gold Mine, Limited.

Some rich ore has been found on this property and the Nisson two-stamp mill has been treating from 15 to 18 tons of ore per day. Development is mostly on the 89-foot level. During the year the mill treated 1,433 tons, producing 580 oz. of bullion valued at $8,264.00.

Schumacher Gold Mines, Limited.

Prospecting on this property, although small in amount, has been fairly successful, and the decision has been reached to erect a cyanide mill during 1915. The method of treatment will be by continuous decantation as shown in the accompanying flow sheet.

Kirkland Lake.

Tough Oakes Gold Mines, Limited.

The only producing property in Kirkland Lake district during the year was the Tough Oakes. The following statements are taken from the annual report of the Tough Oakes Gold Mines, Limited.

Production.

Ore shipped to smelters:

Tons	Oz. Silver	Oz. Gold	Value per ton	Gross Value
212.79	6,325.12	3,448.47	$350 53	$74,590 38

Ore milled:

3,493.0	309.20	2,075.14	22 33	43,053 84

Development.

Following is a summary of the development work performed during the year:

Shafts	252 feet
Drifts	862 feet
Cross-cuts	220 feet
Raises	143 feet
Stopes	2,550 tons

Underground development was confined to veins Nos 2 and 3.

No. 2 Vein. The development work on this vein consisted of sinking the shaft to a depth of 322 feet, cutting station and ore pocket on the 300-foot level, extending the drifts on the three levels, and raising from the 1st and 2nd levels. Some cross-cutting was also done on the two upper levels.

No. 3 Vein. The shaft sunk on this vein continued in good ore to 71 feet, where the vein faulted. The shaft was continued to 124 feet and at 116 feet a station was cut, and cross-cut driven 20 feet south-east where the vein was again intersected. In the 180 feet of drifting on this level the ore developed gives an average value of $32.00 across a stoping width of 62 inches. Further surface trenching along the outcrop of this vein has exposed it for 830 feet.

No. 6 Vein. This vein lies 30 feet north of and parallel to No. 3, and was uncovered by trenching in June. It has been stripped for 1,460 feet, and is in the porphyry for its entire length.

For a length of 740 feet the sampling along the surface gave returns which indicate the value to be about $12.00 per ton for a width of 60 inches.

No. 7 Vein. This vein was found in June, and lies 325 feet north of No. 3. The overburden covering the vein is deep, and thus far it has only been stripped for a length of 245 feet. It is in the greywacké as far as it has been uncovered, and presents a strong outcrop. The quartz will average 18 inches in width with numerous stringers in both walls. The sampling done shows considerable high grade ore, and the results indicate that the value per ton will be about $15.00 for a width of 50 inches.

Power is transmitted 26 miles to the mine from the Charlton Hydro-Electric power plant at Charlton, Township of Dack. The line was completed in April. The power is transmitted at 33,000 volts and is stepped to 2,200 volts in the sub-station at the mine.

The Motor Compressor Plant situate near "A" shaft, consists of a two stage Imperial, Type 10, Rand Air Compressor, driven by a 250 h.p. G.M. Westinghouse motor. It delivers 1,670 cubic feet of free air per minute at normal speed.

The drill shop contains a No. 5 Ingersoll Leyner drill sharpening machine, together with coke furnaces for heating and tempering.

A motor driven, three stage, Centrifugal pump was installed at Gull Lake, and a four inch pipe line was laid to the tanks on the property. These tanks are each 50,000 gallons capacity, one being located above the camp buildings, and the other at the new mill.

The ore that was milled was treated in a five stamp mill using simple amalgamation, but as the tailings ran high in gold values they were impounded and will be re-treated later.

The new mill is located on high ground, 400 feet north of Vein No. 2. A brief description of the treatment is as follows:

Ore from the No. 2 and No. 3 shafts is delivered over an inclined trestle by a self dumping skip of 30 cubic feet capacity. The ore is weighed on track scales outside of the crusher station. The crusher station is located about 40 feet distant from the mill. The ore from the mine is crushed to 1¼ in. ring in two Blake Type Buchanan steel crushers, with intermediate screening. A 14 in. conveyor belt delivers the crushed ore through an inclined conveyor way into the fine grinding bin. This bin has a capacity of 200 tons, and from there the ore is delivered by a short conveyor belt to a 6 ft. Hardinge Ball Mill, crushing in solution. The product of the Hardinge Mill is re-ground in two 20 x 5 ft. tube mills, and operating in closed circuit with two Dorr Duplex classifiers. Amalgam plates are introduced in the tube mill circuit.

The overflow from the classifier, about 85 per cent. of which will pass through 200 mesh screen, is sufficiently ground for further treatment. This pulp flows from the fine grinding department into a 30 x 10 ft. Dorr thickener in the tank room. The spigot product of this thickener is elevated to three 16 x 10 Dorr Agitators, where it receives an agitation of 36 hours duration. The tests show that 80 per cent. of the values go into solution in the grinding process, and 20 per cent. in the agitator.

From the agitators the pulp is conveyed through a series of four 28 x 10 ft. Dorr thickeners operating on the Dorr continuous counter-current decantation system. The pulp is finally discharged to waste from the bottom of the last tank at about 40 per cent. moisture.

The pregnant solution overflowing from the 30 x 10 ft. thickeners is clarified through the vacuum filter leaves and precipitated by zinc fume used in conjunction with Merrill triangular frame presses.

A separate refinery building is equipped with amalgam retort, tilting furnace, and acid treatment equipment.

The mill is heated by steam, and there is complete machine shop, carpenter shop, lime bin, store-house and office.

The mill will treat 100 tons of ore per day, and it is expected to have it in operation about March 15th.

ORE RESERVES.

Vein.	Level	Tons.	Value.
			$
No. 2 Vein	100 feet	10,450	300,000
"	200 "	9,400	580,000
"	300 "	8,900	140,000
No. 3 Vein	116 "	10,000	320,000
Ore on Dumps		7,200	108,000
Tailings Impounded		5,200	52,000
		51,150	1,500,000

The combined average value of the 3,705.79 tons shipped and milled during the year was $41.18 per ton, the average of the high-grade ore being $350.53 per ton, and the recovered value of the milling ore, plus the tailings, being $22.33 per ton.

An interesting comparison showing the relative importance of the agricultural, lumbering and mining industries in the production of the revenue of the T. & N. O. Ry. is shown in the following table covering the last four years.

Industry.	1911	1912	1913	1914
	%	%	%	%
Agriculture	6.5	10	12	13
Lumbering	14.	17	21	26
Mining	48.5	44	48	48
Miscellaneous	31.	29	19	13
Totals	100.	100	100	100

Under the heading of miscellaneous is placed the percentage from freight for construction and also the through freight for the National Transcontinental Railway.

SILVER

The silver production of Cobalt which under normal conditions would likely have shown a decline from last year's figures has had the falling off emphasized by the war. The following table gives the value of the Cobalt production since the commencement of operations in the district.

TABLE No. I.

Year.	Value.
1904	$136,217 00
1905	1,485,570 00
1906	3,573,908 00
1907	6,155,391 00
1908	9,133,378 00
1909	12,456,301 00
1910	15,477,987 00
1911	15,953,895 00
1912	17,390,218 00
1913	16,555,001 00
1914	13,179,973 00
	$111,497,839 00

During the dislocation of business conditions on the declaration of war several of the mines ceased operations, but now all of these have restarted. Certain curtailments have naturally been effected, but otherwise the situation is almost normal. The curtailments of shipments of silver from London to the eastern markets of India and China, and the lack of sufficient transportation facilities to handle the Indian crops for export, has resulted in a lower price for silver than has been reached for many years. The price of silver in London and New York during the year 1914 is shown in the annexed table, which also gives comparative prices for the years 1912 and 1913.

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Nipissing Mine, Cobalt, Ont. Face of west drfft on vein No. 98, 325′ or 4th level. Moyer shaft, granite pebble of Cobalt conglomerate, cut by silver vein.

MONTHLY AVERAGE PRICE OF SILVER.

Month	New York			London		
	1912	1913	1914	1912	1913	1914
January	56.260	62.938	57.572	25.887	28.983	26.553
February	59.043	61.642	57.506	27.190	28.357	26.573
March	58.375	57.870	58.067	26.875	26.669	26.788
April	59.207	59.490	58.519	27.284	27.416	26.958
May	60.880	60.361	58.175	28.038	27.825	26.704
June	61.290	58.990	56.471	28.215	27.199	25.948
July	60.654	58.721	54.678	27.919	27.074	25.219
August	61.606	59.293	54.344	28.375	27.335	25.970
September	63.078	60.640	53.290	29.088	27.986	24.260
October	63.471	60.793	50.654	29.299	28.083	23.199
November	62.792	58.995	49.082	29.012	27.263	22.703
December	63.365	57.760	49.375	29.320	26.720	22.900
Year	60.835	59.791	54.811	28.842	27.576	25.313

New York quotations—cents per ounce troy, fine silver.

London—pence per ounce, sterling silver, 0.925 fine.

The yearly average price of silver for the twelve years in which the camp has been in operation is shown in the following table:

YEARLY AVERAGE PRICE OF SILVER, 1903-1914.

Year.	New York.	London.
1903	52.221	24.750
1904	57.221	26.375
1905	60.352	27.812
1906	66.791	30.875
1907	65.327	30.188
1908	52.864	24.375
1909	51.503	23.687
1910	53.486	24.625
1911	53.304	24.563
1912	60.835	28.031
1913	59.791	27.563
1914	54.811	25.312

New York quotations—cents per ounce troy, fine silver.

London—pence per ounce, sterling silver, 0.925 fine.

A few cents rise in the price of silver would quickly bring out more bullion and ore and stimulate activity in the district. The Cobalt district continues to produce silver at the rate of about 2½ tons of pure silver for each working day.

TABLE II.

ORE SHIPMENTS FROM COBALT SILVER DISTRICT FOR CALENDAR YEAR 1914.

Mine.	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.	Totals.
Alladin	24.00	27.50	.....	.....	.....	53.92	.....	.....	.....	.....	.....	.....	105.42
Bailey	20.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	20.50
Beaver	.....	81.25	.....	31.22	64.01	33.69	32.25	32.33	.....	39.43	.....	77.89	392.07
Casey Cobalt	59.04	27.55	57.74	.....	61.85	61.34	88.62	8.05	85.30	19.89	84.91	54.01	608.30
Chambers Ferland	.....	.....	.....	29.34	43.98	31.89	30.02	32.94	38.28	42.99	58.62	.....	308.06
City of Cobalt	.....	38.88	40.35	37.87	78.57	42.62	42.88	41.29	86.42	86.83	.....	.....	495.71
Cobalt Townsite	235.95	161.28	153.98	178.47	285.37	188.01	210.05	120.79	251.20	165.63	.....	.....	1,950.73
Cobalt Comet	36.38	62.46	38.38	75.16	88.05	46.91	37.88	35.24	37.27	31.67	60.96	36.67	587.03
Cobalt Lake	95.86	125.06	96.15	96.81	96.44	125.50	123.65	32.06	95.08	32.40	.....	.....	919.01
Coniagas	80.49	70.07	128.19	150.88	42.95	155.17	64.46	130.70	127.62	82.50	121.29	62.94	1,217.26
Crown Reserve	88.53	119.91	79.55	136.63	97.57	92.78	100.23	54.67	57.82	49.14	115.29	74.88	1,067.00
Foster Cobalt	4.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4.50
Hudson Bay	128.65	129.67	74.65	77.30	42.96	75.35	119.37	.....	.....	.....	.....	.....	647.95
Kerr Lake	107.78	86.61	34.41	67.39	44.82	42.05	33.96	31.59	33.41	58.87	54.65	32.88	628.42
La Rose	176.48	42.26	129.27	95.92	41.54	218.80	131.49	87.15	208.02	101.45	264.29	85.87	1,582.54
McKinley-Darragh	179.89	281.12	215.53	308.86	306.85	279.29	168.39	207.09	301.18	204.33	202.61	248.36	2,903.50
Mining Corporation of Canada.													
Cobalt Lake	.....	.....	.....	.....	.....	.....	.....	.....	.....	62.69	32.07	128.61	223.37
Townsite City	.....	.....	.....	.....	.....	.....	.....	.....	.....	86.49	246.24	200.67	533.40
Nipissing	157.55	135.21	57.89	116.22	155.30	376.12	130.26	.....	43.29	.....	.....	63.23	1,235.07
O'Brien	32.07	63.28	42.88	31.88	30.63	.....	62.24	33.00	31.80	65.15	63.53	66.75	523.21
Penn Canadian	51.76	25.98	52.32	42.29	59.05	20.95	24.96	60.56	.....	48.47	46.39	27.80	460.53
Peterson Lake	.....	.....	.....	34.10	57.74	.....	.....	.....	.....	30.68	.....	.....	122.52
Gould	.....	.....	30.65	.....	.....	20.00	.....	.....	.....	.....	.....	.....	50.65
Seneca	31.54	52.34	34.31	.....	.....	60.66	64.71	.....	63.72	.....	61.88	29.80	398.96
Right of Way	.....	.....	41.56	.....	31.49	32.44	.....	.....	78.67	.....	.....	.....	184.16
Silver Bar	.....	.....	.....	.....	.....	.....	.....	20.00	.....	.....	.....	.....	20.00
Temiskaming	.....	80.35	61.85	24.90	35.07	37.91	95.69	40.24	.....	.....	.....	41.75	417.56
Trethewey	46.29	43.79	42.31	47.93	52.04	53.39	61.80	62.59	24.42	80.17	54.53	44.02	613.28
Totals	1,557.26	1,654.57	1,411.77	1,583.17	1,716.28	2,048.79	1,622.91	1,030.29	1,563.50	1,288.78	1,467.26	1,276.13	18,220.71

TABLE

ORE SHIPMENTS FROM THE COBALT

(In tons

Mine.	1904	1905	1906	1907	1908
1. Badger					
2. Bailey			30.00		88.80
3. Beaver					
4. Buffalo		200.80	992.80	1,241.54	536.90
5. Casey Cobalt					10.00
6. Chambers Ferland					223.89
7. City of Cobalt				50.61	761.04
8. Cobalt Lake					225.97
9. Cobalt Townsite				143.22	177.71
10. Cobalt Comet (Drummond)	.50	32.15	274.70	104.13	1,161.38
11. Colonial			15.00	40.38	
12. Coniagas		30.60	422.02	2,447.37	610.25
13. Crown Reserve					657.35
14. Foster		83.85	117.00	312.13	191.20
15. Green Meehan			37.03	98.39	
16. Hargrave		28.45			
17. Hudson Bay				149.53	1,094.23
18. Imperial Cobalt				14.61	
19. Kerr Lake		54.95	158.35	319.76	660.24
20. King Edward		19.00		31.12	338.19
21. La Rose	60.05	607.86	854.61	2,815.45	4,843.17
22. Lawson		14.61		61.12	
23. Lost and Found					
24. Lumsden					
25. McKinley Darragh	20.00	447.09	80.45	742.42	1,808.39
26. Mining Corporation of Canada					
27. Nancy Helen				30.10	201.32
28. Nipissing	57.00	486.02	2,125.08	2,538.26	3,571.96
29. North Cobalt					
30. Nova Scotia			43.95	272.21	237.95
31. O'Brien		26.32	114.18	1,491.61	3,459.51
32. Penn Canadian				77.33	187.99
33. Peterson Lake (Leases)					
Gould					
Little Nipissing					40.67
Nova Scotia					
Seneca Superior					
34. Provincial					75.84
35. Princess				3.93	
36. Red Rock				45.71	
37. Right of Way			46.25	129.37	750.04
38. Rochester					
39. Silver Bar					.58
40. Silver Cliff					160.44
41. Silver Leaf		9.00		46.36	197.03
42. Silver Queen		44.73	130.94	478.57	885.70
43. Temiskaming				204.32	795.20
44. Temiskaming Cobalt			20.47	67.98	
45. Trethewey	21.00	218.58	198.48	833.58	1,408.69
46. University		16.00	55.28	60.23	
47. Victoria					.47
48. Violet		16.00	20.00		
49. Waldman					
50. Wyandoh					
Totals	158.55	2,336.01	5,836.59	14,851.34	25,362.10

III.

DISTRICT FOR THE YEARS 1904-1914.

of 2,000 lb.)

1909	1910	1911	1912	1913	1914	Totals.	
.....	.....	27.10	.....	.....	.....	27.10	1
36.85	.....	20.00	41.57	150.35	20.50	388.07	2
51.38	140.06	790.81	402.97	292.21	392.07	2,069.50	3
648.86	1,185.77	1,275.19	1,251.64	66.13	.....	7,399.63	4
8.50	48.40	277.74	214.34	401.54	608.30	1,568.82	5
517.88	885.92	622.85	501.29	223.78	308.06	3,283.67	6
566.82	329.40	281.30	230.00	105.14	495.71	2,820.02	7
95.47	296.80	2,111.32	1,085.22	1,196.33	919.01	5,930.12	8
27.35	310.99	703.51	1,944.77	2,762.54	1,950.73	8,020.82	9
1,225.47	2,194.41	714.83	458.85	610.06	587.03	7,363.51	10
.....	178.60	114.10	86.48	21.56	.....	456.12	11
803.93	1,261.46	1,813.89	2,119.87	1,620.40	1,217.26	12,350.05	12
3,167.52	2,184.25	977.32	561.65	791.15	1,067.00	10,036.24	13
113.90	.....	.....	.....	.....	4.50	822.58	14
.....	.....	102.98	.....	12.96	.....	251.36	15
.....	343.68	102.44	17.35	.....	.....	491.92	16
743.64	260.33	898.88	694.55	609.14	647.95	5,098.25	17
.....	.....	.....	.....	.....	.....	14.61	18
1,173.42	5,088.78	1,292.58	788.10	933.35	628.42	11,097.95	19
146.58	134.12	20.00	.....	87.21	.....	776.22	20
6,757.21	5,131.53	3,581.54	3,511.40	3,275.14	1,582.54	33,020.50	21
.....	.....	.....	.....	.....	.....	75.73	22
.....	.....	.....	65.20	8.80	.....	74.00	23
.....	.....	.....	.....	20.00	.....	20.00	24
1,056.49	2,393.39	3,238.64	2,673.40	2,895.66	2,903.50	18,229.43	25
.....	.....	.....	.....	.....	756.77	756.77	26
116.32	.....	.....	.....	.....	.....	347.74	27
6,470.52	6,833.81	2,952.20	1,869.27	1,950.22	1,235.07	30,089.41	28
6.87	.....	3.00	.....	.....	.....	9.87	29
224.79	.....	.....	.....	.....	.....	778.90	30
1,419.11	608.57	628.44	711.43	703.43	523.21	9,685.81	31
339.01	285.62	22.40	126.35	332.18	460.53	1,831.41	32
.....	.....	.....	.....	.....	122.52	122.52	33
.....	.....	.....	.....	9.00	50.65	59.65	
39.62	313.76	28.45	.....	.....	.....	422.50	
121.15	.....	.....	.....	.....	.....	121.15	
.....	.....	.....	432.97	457.93	398.96	1,289.86	
.....	52.05	100.54	22.22	.....	.....	250.65	34
.....	.....	.....	.....	.....	.....	3.93	35
.....	.....	.....	.....	.....	.....	45.71	36
1,608.99	981.41	666.06	243.24	146.12	184.16	4,755.64	37
.....	28.30	.....	.....	.....	.....	28.30	38
.....	.....	2.72	.....	20.00	20.00	43.30	39
149.06	156.84	92.30	.....	48.05	.....	606.69	40
.....	.....	.....	.....	.....	.....	252.39	41
316.64	.....	.....	31.25	201.98	105.42	2,195.23	42
852.14	1,119.12	855.60	967.31	405.26	417.56	5,617.51	43
.....	.....	.....	.....	.....	.....	88.45	44
1,134.50	536.64	602.98	579.10	587.54	613.28	6,734.37	45
.....	.....	.....	.....	.....	.....	231.51	46
.....	.....	.....	.....	.....	.....	.47	47
.....	.....	.....	.....	.....	.....	36.00	48
.....	38.81	.....	.....	.....	.....	38.81	49
.....	24.15	.....	.....	.....	.....	24.15	50
29,942.99	33,976.97	24,921.71	21,631.79	20,916.16	18,220.71	198,154.92	

TABLE IV.

TABLE SHOWING SHIPMENTS FROM ELK LAKE AND GOWGANDA FOR THE YEARS 1909-1914.

(In tons of 2,000 lb.)

Mine.	1909	1910	1911	1912	1913	1914	Total.
Elk Lake.							
Beaver Auxiliary	.....	.....	.....	.....	.....	1.26	1.26
Downey	.....	.....	.....	.....	.....	9.60	9.60
Hitchcock	.....	.....	4.00	.....	.....	.....	4.00
Lucky Godfrey	.....	17.00	.....	.....	.....	.....	17.00
Moose Horn	.....	3.00	.....	.....	.....	.....	3.00
Gowganda.							
Bartlett	2.00	.....	6.75	.....	.....	.....	8.75
Bonsall	.....	6.78	.....	.....	.....	.....	6.78
Boyd Gordon	.....	30.00	1.25	.....	.....	.....	31.25
Burke Remey	.....	2.00	.....	.....	.....	.....	2.00
Calcite Lake	.....	.....	.....	8.50	.....	.....	8.50
Canadian Gowganda	.....	.....	.....	8.00	.....	.....	8.00
Everett	.....	8.35	.....	.....	.....	.....	8.35
Mann	.....	.....	.....	16.00	20.00	20.00	56.00
Millerett	.....	346.30	128.00	188.00	.....	.....	662.30
Miller Lake O'Brien	.....	31.00	116.50	112.60	172.90	118.80	551.80
Powerful	.....	1.00	.....	.....	.....	.....	1.00
Reeves Dobie	.....	61.00	5.00	.....	.....	.....	66.00
Welsh	.....	1.25	.....	.....	.....	.....	1.25
Totals	2.00	506.68	262.50	333.10	192.90	149.66	1,446.84

TABLE V.

STATEMENT SHOWING ORE SHIPMENTS FROM SOUTH LORRAIN.

(In tons of 2,000 lb.)

Mine.	1908	1909	1910	1911	1912	1913	1914	Total.
Wettlaufer	.....	111.50	226.64	496.00	478.00	120.00	49.46	1,482.60
Keeley	43.25	1.09	.....	21.26	.....	.....	.....	65.06
Bellellen	.....	.....	.....	13.25	.....	.....	.....	13.25
Totals	43.25	112.59	226.64	530.51	478.00	120.00	49.46	1,560 91

TABLE VI.

STATEMENT SHOWING SHIPMENTS FROM COBALT DISTRICT, INCLUDING GOWGANDA, ELK LAKE AND SOUTH LORRAIN.

(In tons of 2,000 lb.)

Years.	Cobalt.	Gowganda.	Elk Lake.	S. Lorrain.	Totals.
1904	158.55	.....	.....	.....	158.55
1905	2,336.01	.....	.....	.....	2,336.01
1906	5,836.59	.....	.....	.....	5,836.59
1907	14,851.34	.....	.....	.....	14,851.34
1908	25,362.10	.....	.....	43.25	25,405.35
1909	29,942.99	2.00	.....	112.59	30,057.58
1910	33,976.97	486.68	20.00	226.64	34,710.29
1911	24,921.71	267.00	4.00	530.51	25,733.22
1912	21,631.79	333.10	.....	478.00	22,442.89
1913	20,916.16	192.90	.....	120.00	21.229.06
1914	18,220.71	138.80	10.86	49.46	18,419.83
Totals	198,154.92	1,420.48	34.86	1,560.45	201,170.71

TABLE VII.

BULLION SHIPMENTS FROM THE COBALT DISTRICT, CALENDAR YEAR 1914.

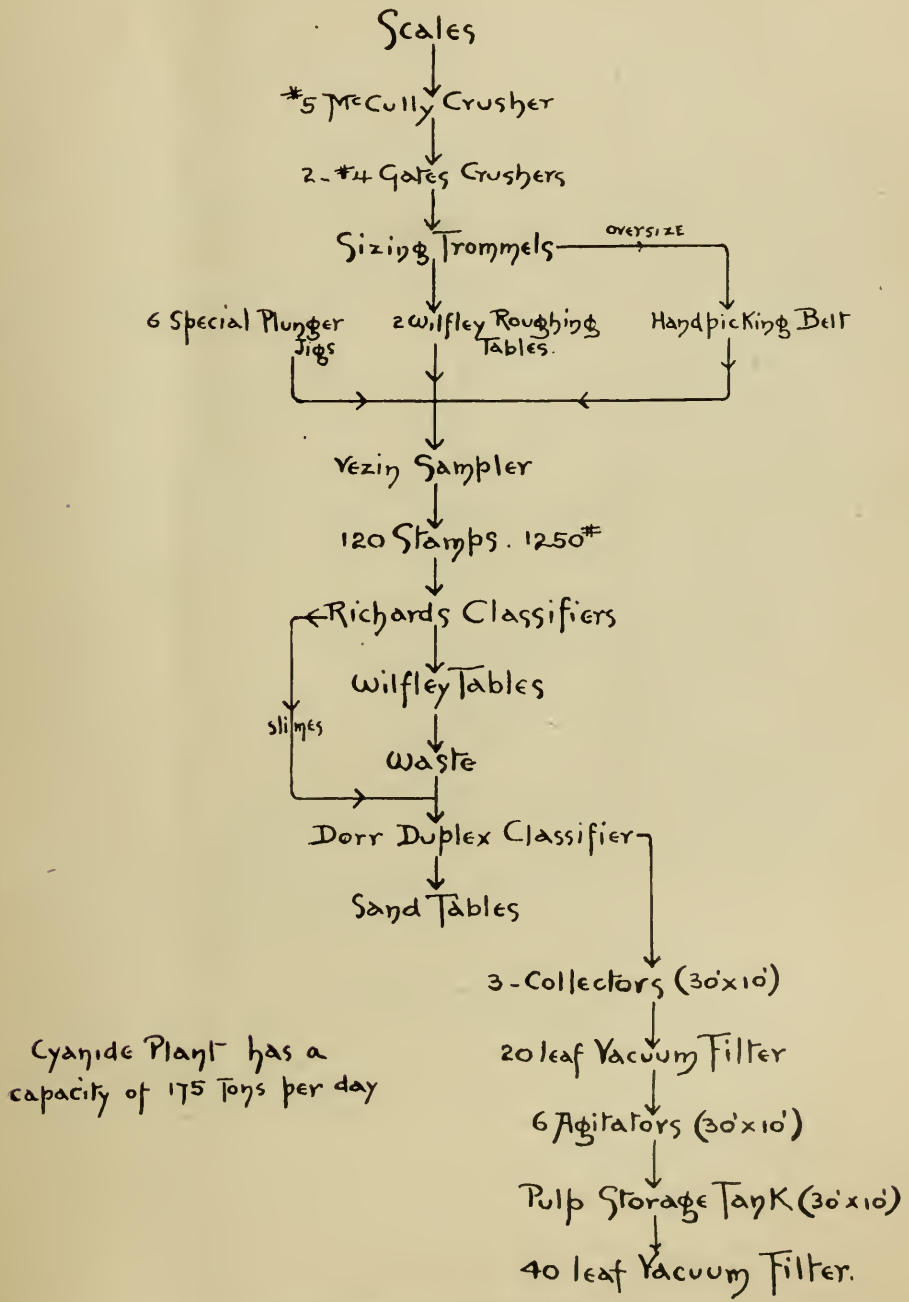
Mine.	Fine.	Value.
	Oz.	$
Bailey	1,353.93	785.27
Beaver	9,849.00	5,004.09
Buffalo	912,250.00	500,013.35
Casey Cobalt	2,566.64	1,343.72
City of Cobalt	27,341.64	15,523.75
Cobalt Comet	1,597.54	923.65
Cobalt Townsite	36,538.86	19,580.17
Crown Reserve	626,374.00	343,822.52
Dominion Reduction	726,397.85	405,885.50
Foster Cobalt	2,157.13	1,017.62
Hargraves	794.00	414.81
Kerr Lake	407,238.53	183,970.15
La Rose	55,365.48	29,066.87
McKinley-Darragh	17,470.00	10,016.55
Nipissing and Customs	6,299,677.75	3,469,526.13
O'Brien	452,822.00	243,933.91
Penn Canadian	16,454.94	8,839.69
Temiskaming	6,163.70	3,553.20
Townsite—City	17,640.35	8,465.83
Trethewey	4,576.04	2,409.86
Total	9,624,629.38	5,254,096.64

DIVIDENDS PAID BY COBALT MINES TO 31ST DECEMBER, 1914.

Mining Company.	Percentage paid during 1914.	Amount of Dividends and Bonuses Paid during 1914.	Total Percentage Paid to 31st Dec., 1914.	Total Amount of Dividends and Bonuses Paid to 31st Dec., 1914.
	Per cent.	$ c.	Per cent.	$ c
1. Beaver	3	60,000 00	23.5	470,000 00
2. Buffalo	28	280.000 00	282	2,787,000 00
3. Caribou Cobalt (Drummond)	7.5	75,000 00	10	100,000 00
4. Casey Cobalt		93.750 00		203,249 33
5. City of Cobalt			23	139,321 42
6. Cobalt Central			4	192.845 00
7. Cobalt Lake	5	150.000 00	15.5	465,000 00
8. Cobalt Silver Queen			21	315.000 00
9. Cobalt Townsite	20	199.953 34	97.5	966.726 31
10. Coniagas	33	1,320,000 00	181	7,240,000 00
11. Crown Reserve	24	424,515 36	337	5,960,894 18
12. Foster			5	45,774 00
13. Hudson Bay (Tem. and Hudson Bay)	900	69,849 00	25,000	1,940,250 00
14. Kerr Lake (Holding Co.)	20	600,000 00	184	5,520,000 00
15. La Rose (Holding Co.)	12	899,176 18	69	* 1,204,862 72 4,974,998 05
16. McKinley-Darragh	21	472,015 32	193	4,337,028 22
17. Mining Corporation of Canada	12.5	259,375 00	12.5	259,375 00
18. Nipissing Mines Co. (Holding Co.)	22.5	1,350,000 00	204	† 400,000 00 12,240,000 00
19. Right of Way Mining Co.			65	324,643 93
Right of Way Mines	1	16,850 00	13	219,110 00
20. Peterson Lake	5.25	126,095 55	5.25	126,095 55
21. Seneca Superior	70	335,218 80	135	645,993 40
22. Temiskaming			56	1,384.156 25
23. Trethewey	5	50,000 00	108	1,061,998 50
24. Wettlaufer			45	637,465 50
25. Private Corporations				3,250,000 00
		6,781,798 55		57,411,787 36

*Profits paid to owners previous to May 31st, 1908.

†Paid to Syndicate in 1905-6.



COBALT REDUCTION COMPANY'S MILL.

MILLING IN COBALT DURING 1914.

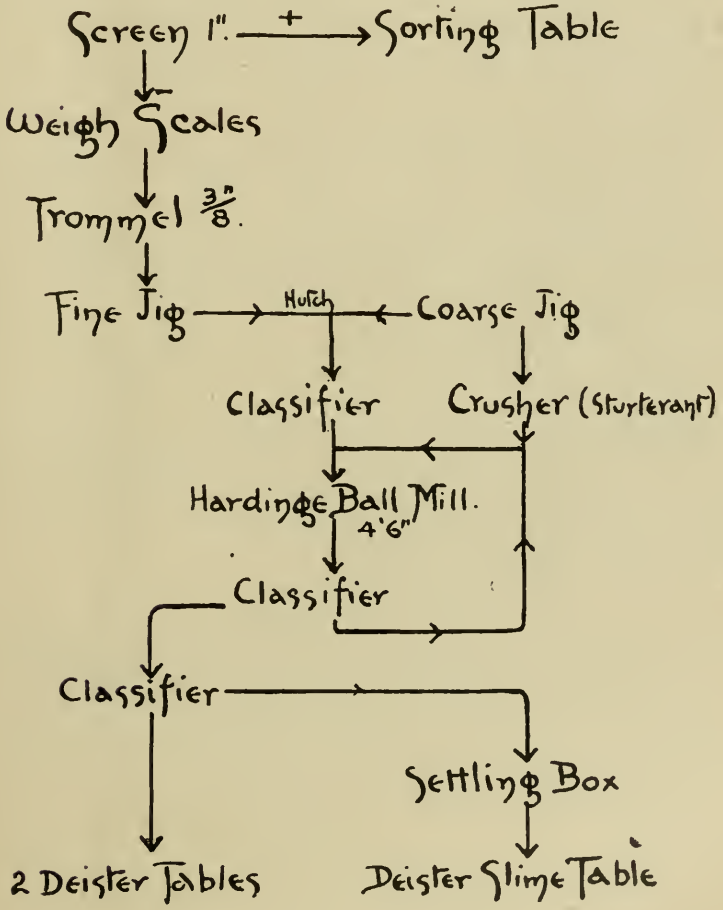
Mills and Mines.	Tons Milled.	Concentrates.			Concentration. Ratio.
		Jigs. Tons.	Tables. Tons.	Totals. Tons.	
1. Beaver	27,069	121.2	227.8	349.0	78-1
2. Buffalo	55,254	.....	.....	832.0	66-1
3. Casey Cobalt	24,236	21.3	534.4	555.7	43-1
4. Cobalt Lake	53,753	272.7	824.6	1,097.3	49-1
5. Cobalt Reduction	92,021	.....	.....	2,717.4	34-1
6. Colonial—					
Right of Way	7,470	.....	.....	146.0	51-1
7. Coniagas	54,646	124.0	625.0	749.0	73-1
8. Hudson Bay	11,304	96.2	261.2	357.4	31-1
9. McKinley-Darragh	66,765	161.0	2,344.0	2,505.0	27-1
10. Northern Customs—					
La Rose	52,273	.....	1,233.1	1,233.1	42-1
Chambers Ferland	10,625	.....	311.0	311.0	34-1
Cobalt Alladin	1,120	.....	38.6	38.6	29-1
Cariboo Cobalt	1,042	.....	37.4	37.4	28-1
11. O'Brien	51,892	97.0	189.0	286.0	181-1
12. Penn Canadian	25,478	98.3	278.8	377.1	68-1
13. Seneca Superior	2,526	40.9	67.4	108.4	23-1
14. Temiskaming	18,779	82.8	292.8	375.6	50-1
15. Trethewey	35,215	53.2	553.4	606.6	58-1
Total	591,468			12,682.6	47-1

Cyanide Mills.	Tons Milled.	Oz. Bullion Produced.
16. Dominion Reduction—		
Comet (Drummond)	20,160.2	
Crown Reserve	31,503.0	
Drummond Fraction	3,674.0	
Kerr Lake	17,601.5	1,586,783
17. Nipissing, Low Grade	79,125.0	2,261,023
	152,063.7	3,847,806

Total tons milled by Water Concentrating Mills	591,468
Total tons milled by Cyanide Mills	132,062
Total tons milled, 1914	743,531
Total tons milled, 1913	664,845
Total tons milled, 1912	455,517
Total tons milled, 1911	381,871
Total tons milled, 1910	305,513
Total tons milled, 1909	126,421
Total tons milled, 1908	49,424
Grand Total	2,727,122

At the *Buffalo Mine* the cyanide plant, which forms part of the Low Grade Mill, treated 9,105 tons of slimes, producing 67,429 oz.

The *Cobalt Reduction Mill,* which now forms part of the Mining Corporation of Canada, Ltd., has been extended by the addition of a cyanide plant for the treatment of slimes, doing away with the use of vanners.



SENECA SUPERIOR MILL.

At the *Dominion Reduction Mill* besides the silver bullion there were produced 1,764 tons of amalgamation residues, which were shipped to the smelters.

In the *O'Brien Mill* the jig concentrates contained 139,022 oz. and the table concentrates 278,045 oz. The tailings from the concentrating tables amounting to 51,606 tons were cyanided and produced 448,720 fine oz. silver.

High Grade Mills.

The *Buffalo High Grade Mill* treats the concentrates from the Low Grade Mill as well at metallics, and hand picked raw ore from the mine. The record for 1914 was:

Tonnage Treated.	
Raw ore	14 tons
Concentrates and metallics	792 tons
Bullion produced	930,551 fine oz.

The residues from this mill have been stored for a possible further treatment for the nickel, cobalt and other valuable constituents. They have already been re-treated and the mercury extracted that was taken up in the amalgamation process used for the extraction of the silver.

The *Nipissing High Grade Mill* treated a total of 1,885 tons, made up of 920 tons Nipissing ore containing 2,118,346 oz., and 965 tons customs ore containing 2,335,834 oz.

The Nipissing Company shipped 1,238 tons of residues from their High Grade Mill, most of which was shipped to Birmingham, England, the value being in the cobalt contents.

*Mercury Recovery.

In the amalgamation of Cobalt high grade silver ores and concentrates in strong cyanide solution, as practised in that district, considerable mercury is contained in the residues from the amalgamation process. This mercury exists in the residues as mercuric sulphide in most part, only from five to ten per cent. of the total mercury content being in the metallic state.

Attempts to eliminate this loss in the amalgamation process were tried, but these all resulted in a low extraction of the silver content of the ore, and attention was then directed toward the recovery of the mercury from the residues.

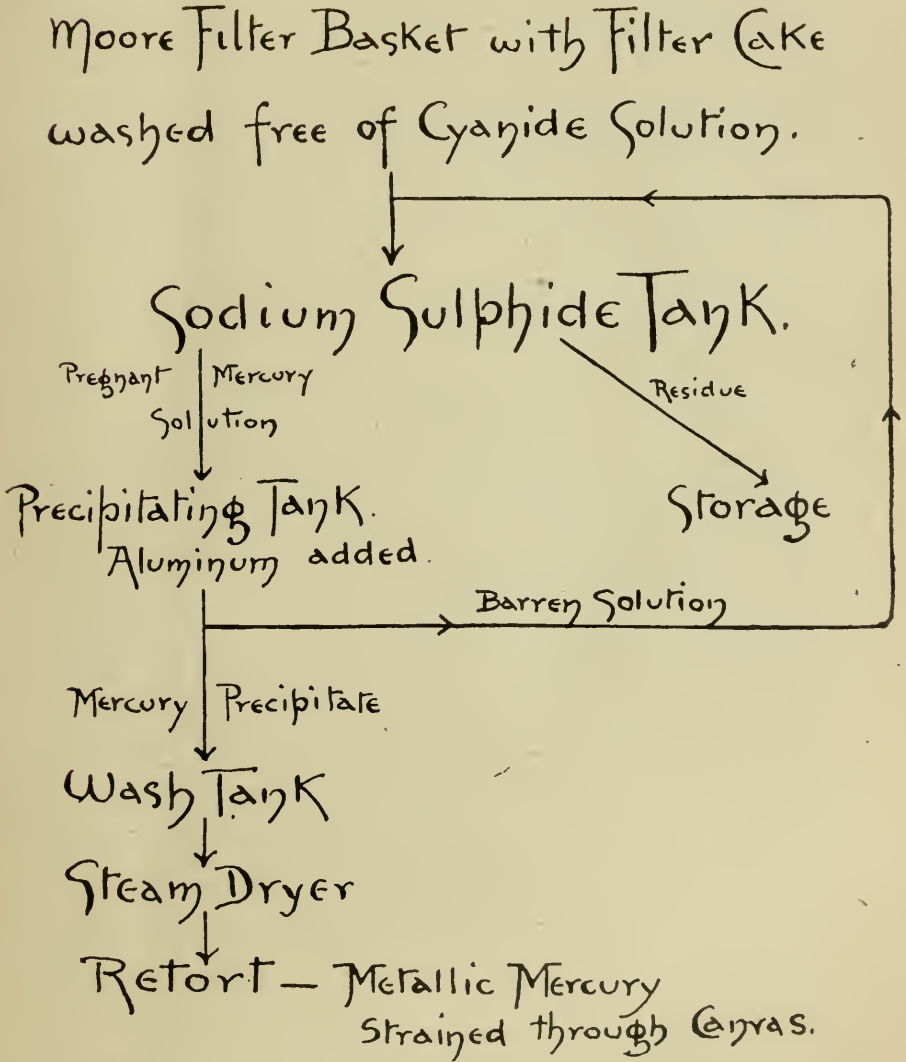
The process developed at the Buffalo Mines for this purpose consists, in short, in leaching out the mercuric sulphide with a caustic, alkaline sulphide solution, and precipitating the mercury from solution with metallic aluminum. The equations for solution (1) and precipitation (2) are:

(1). $HgS + Na_2S = HgS.\ Na_2S$

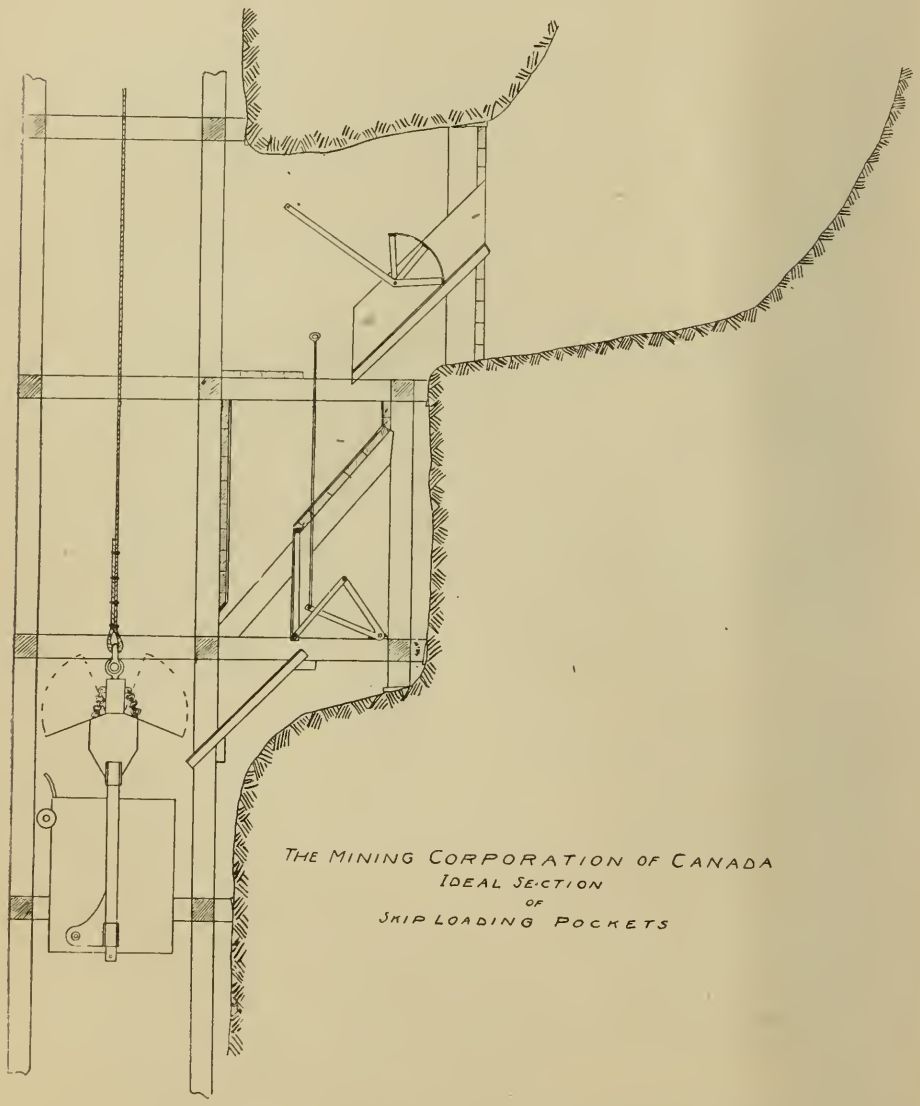
(2) $3HgS.\ Na_2S + 8NaOH + 2Al = 3Hg + 6Na_2S + 2Na\ Al\ O_2 + 4H_2O$

Small scale experiments showed that a complete extraction of the mercuric sulphide could be made by an eight to ten minute treatment of the residues with the alkaline sulphide solution.

*E. B. Thornhill, Transactions, Canadian Mining Institute, 1915.



MERCURY EXTRACTION PLANT AT THE BUFFALO HIGH GRADE MILL.



Ideal Section of Skip Loading Pockets. The Mining Corporation of Canada, Limited.

Copyright, Canada, 1914, by Arthur A. Cole.

Vein 27. 200' level. City of Cobalt Mine. Mining Corporation of Canada, Limited.

Advantage was taken of this fact in the commercial plant, by applying the solvent to the residue on the filter leaf, as no agitation of any sort was required.

The operation of the constructed plant is essentially as follows:

The residue in the pregnant cyanide solution is caked on a Moore filter leaf of the usual construction and the cake washed free of silver solution with water. The basket is then lowered into the sodium sulphide solution and this solution drawn through the cake until the effluent shows only a trace of mercury. Usually one ton of solution per ton of residue is sufficient. This mercuric sulphide solution is pumped to a precipitating tank and the mercury precipitated by adding granular aluminum to the agitated solution. Agitation is then stopped, the precipitate allowed to settle, and the clear solution decanted. The precipitate is then run to a small wash tank by sweeping it out through a hole in the bottom, by taking a raking mechanism similar to a Dorr thickener, having pieces of old rubber belting riveted to the bottoms of the rakes. The precipitate is then washed with water by decantation and drawn off into a steam drying pan. After drying, the fluid mercury is separated from the powdered metallic by raking the latter off with a hoe. The fluid is strained through canvas and is ready to return to the circuit. The powdered material containing approximately seventy-five per cent. mercury is then returned and the mercury condensed in the usual manner.

From May, 1914, to December 31st, 1914, 36,075 pounds of mercury have been recovered at a cost of approximately 13c. per pound for labor and chemicals.

The mercury produced by this process is of exceptional purity. Ledoux & Co. report one-quarter oz. of silver, it being the only impurity in determinable quantity.

This mercury is at present being used by the leading electrical concern in the United States for its mercury convertors, without purification.

An amalgamation of considerable importance was completed early in the year between the Cobalt Townsite Mining Company, the City of Cobalt Mining Company, the Townsite Extension Mining Company and the Cobalt Lake Mining Company. The Cobalt Reduction Mill was also included.

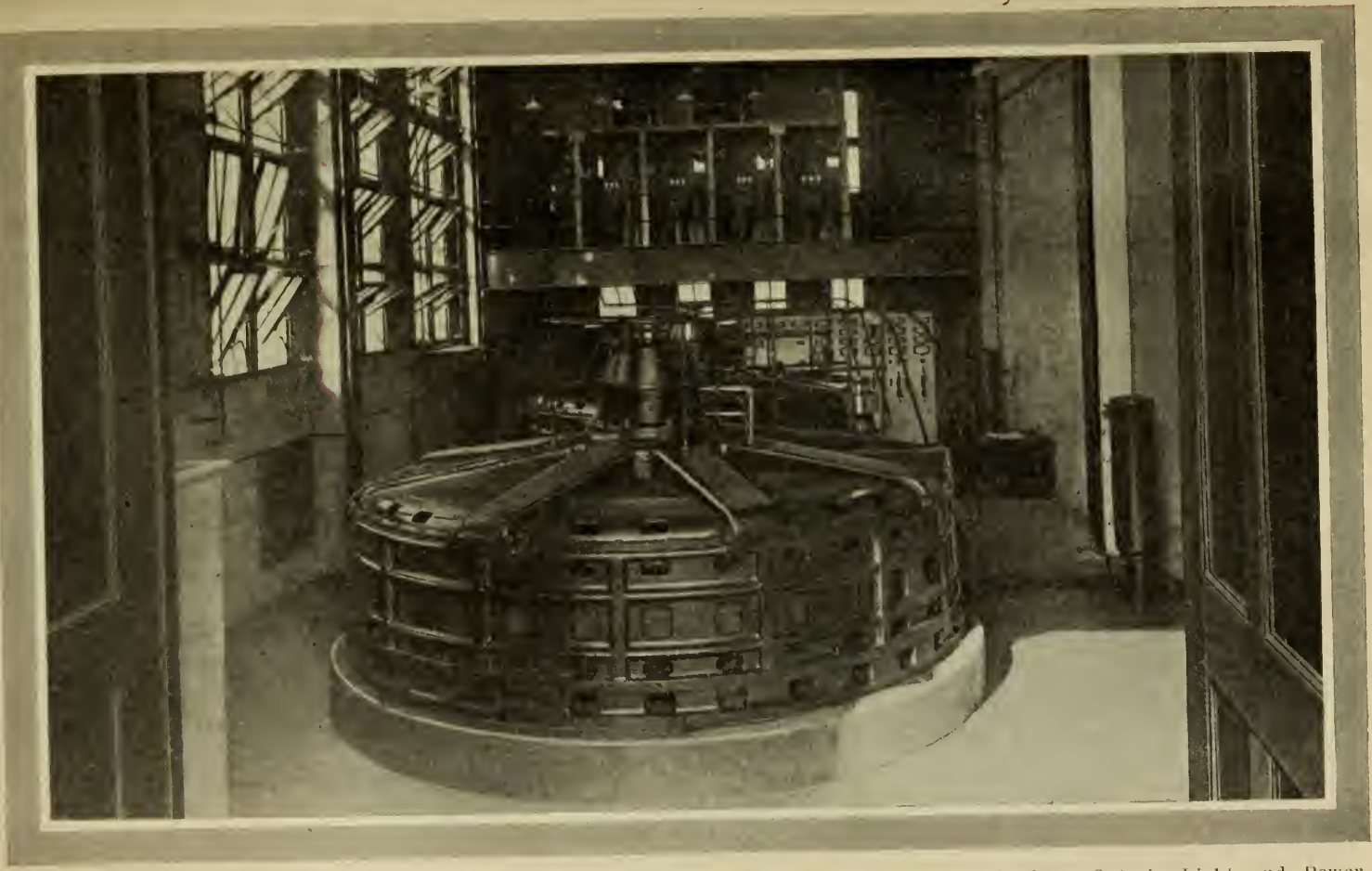
A new three compartment vertical shaft has been sunk on the Townsite property close to the mill to which is now trammed all ore from both the Townsite and the City of Cobalt mines. The shaft is fitted with two ton self dumping skips, which can be run in balance. A new head frame was erected and the coarse crushing department of the mill entirely remodelled. A cyanide treatment plant has also been added to the mill handling all slimes, as is shown in the accompanying flow sheet.

At *Kerr Lake* pumping operations were continued for the purpose of clearing out a portion of the mud lying on the old lake bottom. Progress at this work was found to be slower than anticipated.

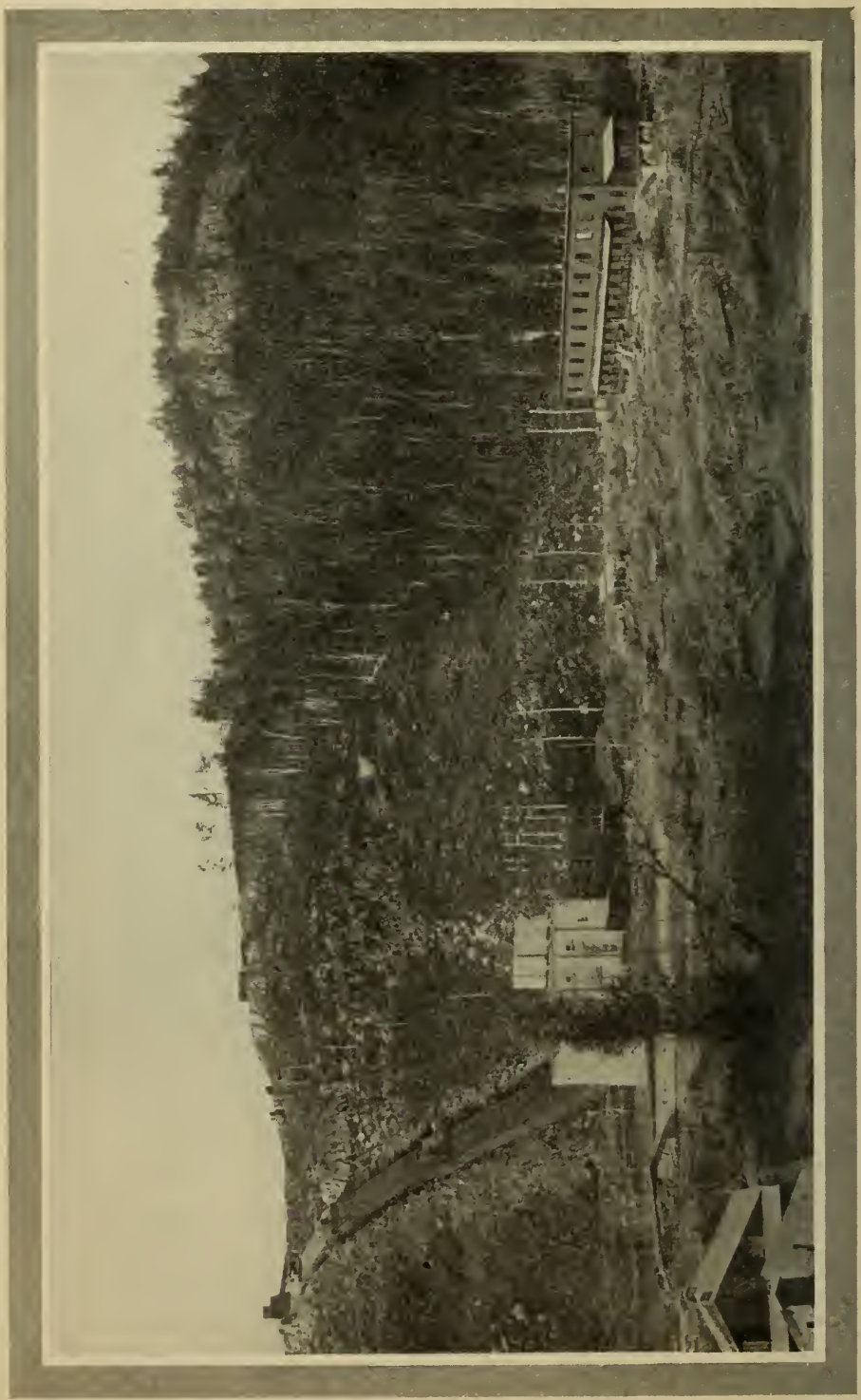
The outlet of *Cobalt Lake* has been lowered so that the water level in the lake has fallen over six feet. Arrangements are in progress so that the pumping out of the lake may commence early in the summer of 1915.

In the outlying districts there has not been much mining activity. The *Casey Mine* in Casey Township, north of New Liskeard, was a steady producer during the year, but most of the work accomplished was development work.

The only other steady producer was the *Miller Lake-O'Brien* at Gowganda. The ten stamp mill of this company milled 2,348 tons producing 45.95 tons of concentrates. This mine now has a power plant situated at the outlet of Gow-



Fountain Falls Generating Station, Interior View, showing Switch board and Both Galleries. Northern Ontario Light and Power Company, Limited.



Matabitchouan Power House and Penstock Operators' Residences on the right. Northern Ontario Light and Power Company, Limited.

ganda Lake on the Montreal River, in which is installed two turbines of 400 h.p. each, and a 900 h.p. generator. At the mine a 20 drill compressor has been installed, which is driven by a 340 h.p. motor.

Power.

Cobalt.

During the early part of May, 1914, the Fountain Falls station of the Northern Ontario Light & Power Co., Ltd., was put in commission. This plant is located on the Montreal River 1½ miles below Ragged Chutes.

A concrete dam 400 ft. long diverts the water into a short canal, where it is passed through two 1,500 h.p. I. P. Morris Co., vertical water wheels, operating under a tentative head of 30 ft. These wheels are direct connected to two 3-phase, 60 cycle, 150 r.p.m., 11,000 volt, 1,250 k.v.a. Swedish General Electric Co's. alternating current generators.

Power for the excitation of these generators is supplied by two 52 k.w., 220 volt, 1,200 r.p.m., motor driven generators.

Power for these exciter sets is being supplied through four 40 k.v.a. oil insulated, self cooled, single phase, 60 cycle transformers, which step the voltage down from 11,000 to 220 volts.

Speed control on the generators is obtained by Pelton, type "G," oil pressure Governors, shaft driven from the generator shaft, and direct connected to the turbine gates. Each governor is equipped with a tachometer and a motor for switchboard control.

The intake gates are motor driven, and are operated from a controller mounted on the forebay platform.

The generating station is built of reinforced concrete throughout, and is illuminated entirely with Tungsten lamps.

This station operates in parallel at all times with the Hound Chute and Matabitchouan stations belonging to the same company.

Freight Rates.

From Cobalt, North Cobalt, Haileybury and New Liskeard to North Bay:—

Silver Ore, Carloads, Minimum 40,000 Lbs., T. & N. O. Ry.

Below $49.00 per ton	10c. per 100 lbs.
Above $49.00 per ton, billed to Canadian points	14c. per 100 lbs.
Above $49.00 per ton, billed to outside points	16c. per 100 lbs.

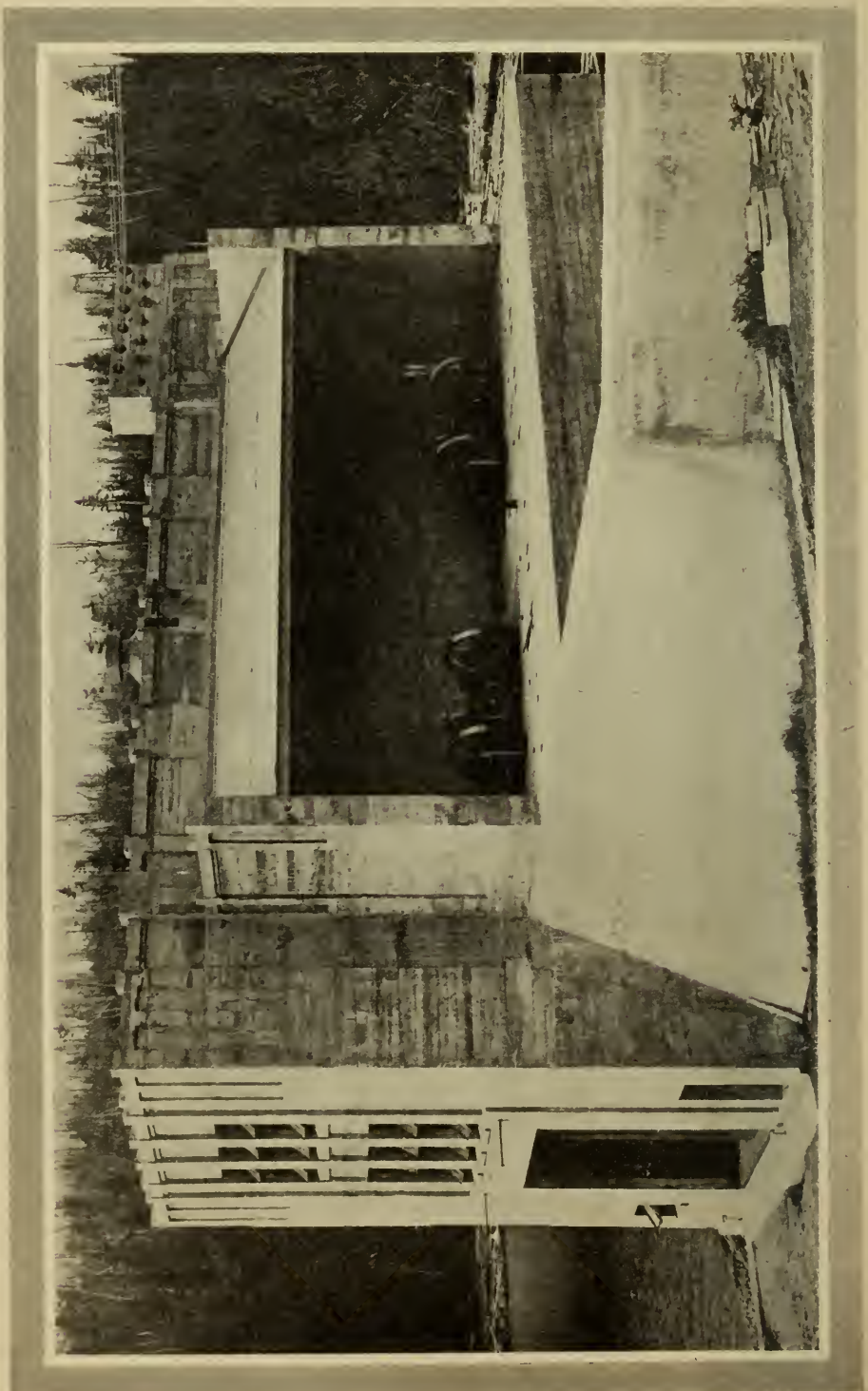
From Elk Lake to North Bay.

Below $49.00 per ton	11c. per 100 lbs.
Above $49.00 per ton, billed to Canadian points	15c. per 100 lbs.
Above $49.00 per ton, billed to outside points	17c. per 100 lbs.

Silver Ore, Carloads, Minimum 40,000 lbs.

Effective February 1st, 1915.

From North Bay, Ont., to:—	Rates in cents per 100 lbs.			
	A	B	C	D
Kingston, Ont.	15	17	23	29
Marmora, Ont.	18	20	26	33
Thorold, Ont.	14	16	21	26
Welland, Ont.	15	17	22	28



Fountain Falls Generating Station. Forebay and Motor Operated Intake Gates. Northern Ontario Light and Power Company, Limited.

Effective February 15th, 1915.

Cincinnati, Ohio	20.0	23.1	30.5	37.8
Denver, Col.	41.0	47.3	*56.4	64.1
Detroit, Mich.	18.9	21.0	27.3	34.1
East Chicago, Ind.	23.1	27.3	35.7	44.6
Flint, Mich.	21.0	25.2	33.1	41.0
Omaha, Neb.	31.0	37.2	45.5	54.1
International, Utah	61.0	70.3	82.4	95.4

*Shown in C. P. R. tariff E. 2568 as 55.4.

Application of Rates.

Group A.—Rates apply when valuation is under $50.00 per ton.
Group B.—Rates apply when valuation is over $50 and under $100 net ton.
Group C.—Rates apply when valuation is over $100 and under $500 net ton.
Group D.—Rates apply when valuation is $500 and over per net ton.

When shipments are made to Eastern United States points, a through rate is not quoted, but cars are billed to the frontier, to Buffalo, Black Rock or Suspension Bridge, N.Y. From there new rates and ratings apply.

Silver Ore, Carloads, Minimum 40,000 lbs.

	Rates in cents per 100 lbs.			
From North Bay to—	A	B	C	D
Buffalo, Black Rock or Suspension Bridge, N.Y., U.S.A.	13.1	15.8	20.5	25.7

Application of Rates.

Group divisions A, B, C and D apply on same valuation as in previous table.

Silver Ore, Carloads, Minimum 50,000 lbs.

From Buffalo, Black Rock and Suspension Bridge, N.Y., to—

	Rates in cents per 100 lbs.			
	A	B	C	D
Bergen Junction, N.Y.	13.8	16.9	23.6	29.8
Carnegie, Pa.	10.5	12.1	18.5	26.8
Chrome, N.J.	13.8	16.9	23.6	29.8
Newark, N.J.	13.8	16.9	23.6	29.8
New York, N.Y.	13.8	16.9	23.6	29.8
Perth Amboy, N.J.	13.8	16.9	23.6	29.8

Application of Rates.

Group A.—Rates apply when valuation is under $100 per net ton.
Group B.—Rates apply when valuation is over $100 and does not exceed $800 per net ton.
Group C.—Rates apply when valuation is over $800 and does not exceed $2,000 per net ton.
Group D.—Rates apply when valuation is above $2,000 per net ton.

Note.—Shipments are billed at the highest rates (Column D), and charges are collected at destination accordingly. On presentation of paid expense bill and signed assay certificate from the smelter, showing the value of the ore to be less than the rating of Group D, charges are adjusted in accordance with the valuation to the above rates. The smelter returns to the mine or owner before deducting transportation charges are the values used in determining the freight rates.

ORE RATES—IN CENTS PER 100 POUNDS FROM COBALT, ONTARIO.

To	—	Under $50	Under $100	Under $500	$500 and over
Niagara Frontier	1914	22.5	31	35.5	40.5
	2-15-15	23.1	31.8	36.5	41.7
Cincinnati, Ohio	1914	29	38	45	52
	2-15-15	30	39.1	46.5	53.8
Detroit, Mich	1914	28	36	42	48.5
	2-15-15	28.9	37	43.3	50.1
Denver, Colo	1914	50	62	70	78.5
	2-15-15	51	63.3	71.4	80.1
E. Chicago, Ind	1914	32	42	50	58.5
	2-15-15	33.1	43.3	51.7	60.6
International, Utah	1914	70	85	97	109.75
	2-15-15	71	86.3	98.4	111.4
Flint, Mich	1914	30	40	47.5	55
	2-15-15	31	41.2	49.1	57
Omaha, Neb	1914	40	52	60	68.5
	2-15-15	41	53.2	61.5	70.1
Carnegie, Pa	1914	32.5	41	47	52
	2-15-15	33.6	42.3	47	53.8
Perth Amboy, N.J	1914	35.5	44	48.5	56.5
	2-23-15	36.9	45.6	50.3	58.6

Smelting.

The market for Cobalt silver ores during 1914 was practically the same as during the preceding year. Three companies took most of the output, being the

Coniagas Reduction Company, Thorold, Ont.
Deloro Mining and Reduction Company, Limited, Deloro, Ont.
American Smelting and Refining Company, Denver, Col.

CONIAGAS REDUCTION COMPANY.

No alterations have been made in the purchasing schedule of the company during the year. The only addition to the plant to be reported is the erection of extra storage bins for by-products for which there is very little or no sale since the outbreak of the war. The output of the smelter up to the 31st December, 1914, is as follows:

Year	Ore treated. Tons	Silver, Fine. Oz.	Cobalt, Oxide. Tons.	Nickel, Oxide. Tons.	White Arsenic. Tons.
1908	266.8	360,683	5.5	1.5	13.5
1909	1,116.9	1,659,604	.9	.....	100.0
1910	2,017.25	3,485,243	53.8	13.2	557.7
1911	2,821.50	5,770,271	60.5	17.3	766.1
1912	2,288.77	4,824,632	129.0	50.7	636.7
1913	2,509.8	4,977,012	250.6	115.6	319.4
1914	1,968.78	3,865.546	171.9	124.9	399.2
Totals	12,989.80	24,942.991	672.2	323.2	2,792.6

Deloro Mining and Reduction Co. Ltd.

The ore purchasing schedule of this company remains the same as that in force in 1913. Additions and enlargements to the plant give a present balanced capacity of 300 to 400 tons of silver-cobalt ore per month. A spur line connecting the works with Marmora Station, C. O. Railway was built, and has been in operation since September, 1913. This spur line is operated by the smelting company with its own locomotive, all ore, fuel and supplies thus being delivered in original cars at the works.

A "metals" department has recently been added to the oxide plant and cobalt and nickel metals are now turned out in the forms required by the market. Notwithstanding the serious falling off on the sales of by-products occasioned by the war, this company has continued to purchase without interruption throughout the year.

PRODUCTION OF DELORO SMELTER, 1908, TO 31ST DECEMBER, 1914.

Year.	Ore Treated.	Silver, Fine.	Cobalt and Mixed Oxides.	Refined Arsenic.
	Tons.	Oz.	Tons.	Tons.
Previous to 1913	11,065	20,339,860	500	3,275
During 1913	2,920	6,350,500	190	893
During 1914	3,612	5,207,000	300	1,038
Totals	17,597	31,897,360	990	5,206

American Smelting and Refining Company.

Several American smelting companies received shipments of Cobalt silver ore during the year, but the majority went to the works of the American Smelting and Refining Co., either at Perth Amboy, New Jersey, or Denver, Colo.

The only change in the smelting schedule was that while the low grade ores going to Denver formerly paid $9.00 per ton smelting charge with an arsenic penalty, this has now been changed to $10.00 smelting charge with no arsenic penalty.

NICKEL

Nickel ore shipments from the Alexo Mine continued regularly till August when a close down took place until the nickel situation readjusted itself to new conditions. Shipments were resumed in November and are now continuing regularly. The ore is sold outright to the Mond Nickel Company and is treated with their own ores in their smelter at Coniston, Ontario. A statement of shipments from the Alexo Mine for the calendar year 1914 is given herewith.

NICKEL ORE SHIPMENTS OVER THE T. & N. O. RY.,

CALENDAR YEAR 1914.

Month.	Tons (2,000 lb.)
January	744.00
February	622.45
March	928.00
April	582.90
May	892.25
June	961.60
July	653.75
August	564.10
September	.....
October	.....
November	311.30
December	878.00
Total	7,138.35

COPPER

In January a trial shipment of 66 tons of copper ore was made to an American smelter by the Dane Mining Co. from its property near Dane, mileage 160. As development did not prove satisfactory operations were discontinued.

MINING ROYALTIES AT COBALT

As there appears to be some misconception as well as lack of appreciation of the reasons for the royalties payable by certain mines at Cobalt, the following explanatory notes may be of interest.

When the Temiskaming & Northern Ontario (Ontario's Government Rail way) was started, the Government placed the management under a Commission. The railway was granted a right-of-way and also certain townsites along the line of location. Later on the Government also granted to the railway the minerals underlying the right-of-way and under the townsites except where these had already been disposed of. In the vicinity of Cobalt these mining rights proved very valuable both in the case of the right-of-way itself and also under the townsite.

Instead of undertaking mining operations itself the Railway Commission divided its mining lands into convenient lots or parcels and leased them to companies or individuals, who acquired them by public tender. In this way four leases have worked and made returns to the railway.

1. The Cobalt Townsite Mining Company.
2. The City of Cobalt Mining Company.
3. The Right of Way Mining Company.
4. The Nancy Helen Mines, Limited.

The company acquiring a lease paid a cash bonus to begin with and thereafter a royalty on shipments. Originally the royalty was based on the value of the ore at the collar of the shaft, but this was later changed to a percentage of the net profits.

The policy of the Railway Commission has been to assist the lessees from time to time by a gradual reduction of royalties as the resources of the mines were exhausted. This has worked out in a satisfactory manner both to lessor and lessee.

Each lease started out by paying 25 per cent. royalty on the value of all shipments at the collar of the shaft, with the one exception of the Townsite Company, which was supposed to pay 50 per cent. royalty on all ore assaying over $1,000 per ton, and 25 per cent. on ore assaying lower than that amount. This was early considered unsatisfactory and a uniform royalty of 25 per cent. on gross value was adopted. The next reduction was to 25 per cent. net, or to be more explicit, 25 per cent. on profits calculated as in the Supplementary Revenue Act (now called The Mining Tax Act).

The further successive reductions have been to 20 per cent., 17 per cent., 15 per cent., 12½ per cent., 10 per cent. and 7½ per cent. On July 1st, 1914, all leases from the Railway Commission were reduced to 7½ per cent., and the agreement now stands that this will be the royalty till 1st September, 1915, on which date all royalties will be reduced to 5 per cent. on profits.

By the above leasing system the lessee only pays a royalty on ore recovered. The fairness of this system, particularly to the lessee may be illustrated by the following example.

To the south of the Town of Cobalt there are two lots of approximately 40 acres each, the Silver Queen and the Cobalt Townsite properties. In 1906, when Cobalt properties were coming prominently before the public, the Silver Queen property was part of the holdings of the Hudson Bay Mining Company, while the Cobalt Townsite property belonged to the T. & N. O. Ry. These two properties lying side by side each had silver-bearing veins exposed on the surface and similar geological conditions. The ore exposed on the Silver Queen was richer

than that on the Townsite, but the area of silver-bearing formation was more restricted on the Silver Queen property, so that a comparison of these two properties is legitimate.

The Silver Queen property was sold to the Silver Queen Mining Company for $810,000 cash. This meant that this amount of capital had to be expended to acquire the property before any ore could be taken out.

In the case of the Cobalt Townsite property, instead of selling it for a large cash payment, which could easily have been obtained, the T. & N. O. Ry. Commission leased the property to the Cobalt Townsite Mining Company on a long time lease (999 years) exacting a payment of $50,000 cash bonus and a royalty on all ore extracted.

In the former case the purchaser had to pay the whole $810,000 cash before there was any chance of a return, while in the latter case only 1/16th of this amount had to be paid to begin with, and the further payments were only made as the ore extracted was sold. These royalties to date have amounted to $279,482.72.

The Railway Commission expects to receive further royalties from this property in the future, but the operating company only pays these on receipts from sale of ores. It does not have to assume the responsibility of a large cash payment at the commencement of operations and consequently its capital is left available for development work and the fairness of the arrangement to both parties concerned is obvious.

The royalties received by the T. & N. O. Ry. Commission from its mining leases to the 31st October, 1914, are as follows:

Cobalt Townsite	$279,482 72
City of Cobalt	100,791 13
Right of Way	272,109 17
Nancy Helen	6,126 60
Mining Corporation of Canada	8,405 60
Total	$666,915 22

A number of other mines at Cobalt pay royalty directly to the Government on certain special arrangements, but these have nothing to do with the T. & N. O. Ry. Commission. Thus, when the Crown Reserve mine was sold by the Government, a clause was attached to the deed of sale whereby the Crown Reserve Company paid a certain amount of cash for the property and in addition pays a royalty of 10 per cent. on all ores shipped, the valuation being the gross value at the collar of the shaft. A similar clause was attached to all sales of lots in the Gillies Limit.

The mines paying royalty directly to the Ontario Government are shown in the following statement:

ROYALTIES PAID THE ONTARIO GOVERNMENT TO THE 31st OCTOBER, 1914.

Mine.	Amount Paid to 31st Oct. 1913.	Amount Paid Oct. 31st, 1913, to Oct. 31st, 1914.	Total Amount to 31st Oct., 1914.
	$ c.	$ c.	$ c.
O'Brien	695,067 85	5,898 22	700,966 07
Crown Reserve	705,641 69	66,241 75	771,883 44
Hudson Bay	324,261 21	2,545 14	326,806 35
Chambers Ferland	26,259 64	.....	26,259 64
Hargraves	1,200 00	.....	1,200 00
Waldman	777 48	.....	777 48
Wyandoh	1,421 72	.....	1,421 72
Provincial	6,735 14	.....	6,735 14
Grand total	.....	.....	1,836,049 84

The above royalties are paid on the following bases:

O'Brien Mine.

Fifteen per cent. of the net profits as ascertained on the basis of the Mining Tax Act, (R.S.O. 1914, ch. 26, sec. 5). The royalty at first was at the rate of 25 per cent. of the value of the ore at the pit's mouth (less surface costs) but was reduced in 1913.

Crown Reserve Mining Co.

Ten per cent. of the value of the ore at the pit's mouth.

Hudson Bay Mines.

Ten per cent. of the net profits as ascertained on the basis of the Mining Tax Act. The rate charged at first was 15 per cent. on the net smelter returns, but was reduced in 1913.

Chambers Ferland Mining Co.

At first 25 per cent. of the value of the ore at the pit's mouth, as in the case of O'Brien Mine. Afterwards reduced to 25 per cent. of the net profits on the basis of the Mining Tax Act; and in 1912 the royalty was abolished, reserving to the Crown the right, in case of rich ore being found in quantity, to impose the royalty up to the extent of 25 per cent. on the net profits as above.

Hargraves Silver Mine.

Same as Chambers Ferland.

Waldman Silver Cobalt Mining Co.

Ten per cent. of the value of the ore at the pit's mouth.

Wyandoh Mining Company.

Ten per cent. of the value of the ore at the pit's mouth.

Cobalt Provincial Mines.

Ten per cent. of the value of the ore at the pit's mouth.

The Peterson Lake Mining Company has divided its property up into 10 acre lots and has leased a number of these lots to independent mining companies on a royalty basis. Thus the Seneca Superior and the Gould are working leases from the Peterson Lake Company paying the owning company 25 per cent. on all ore shipped, calculated on the gross smelter returns. In these cases the royalty is paid to the Peterson Lake Company and none is paid to the Government. Only Bonanza veins can pay on such a basis.

The Ontario Government collects a revenue from mining companies throughout the Province through the operation of the Mining Tax Act. This is a tax, however, and not a royalty, and is calculated on the basis of 3 per cent. on all profits above $10,000 annually.

RECORD OF DEEP WELLS ALONG THE LINE OF THE T. & N. O. RY.

The T. & N. O. Ry. Commission has had certain deep wells drilled along the line of the railway for the purpose of obtaining water supply for engines and for stations.

In the clay country, north of Cobalt, good wells are exceptional. The clay is practically impervious and it is difficult to obtain an abundant supply of water, except by drilling into the underlying rock. The wells at Englehart were drilled to supply the railway and the town with good drinking water, that in the Blanche River being unfit for this purpose. The Commission instructed that wells be drilled at other points in order to provide a supply of drinking water to employees located at the different stations.

The logs or records of a number of these wells are published herewith. For the purpose of comparative records the statement is also given of a number of borings put down by private enterprise in the vicinity of New Liskeard:

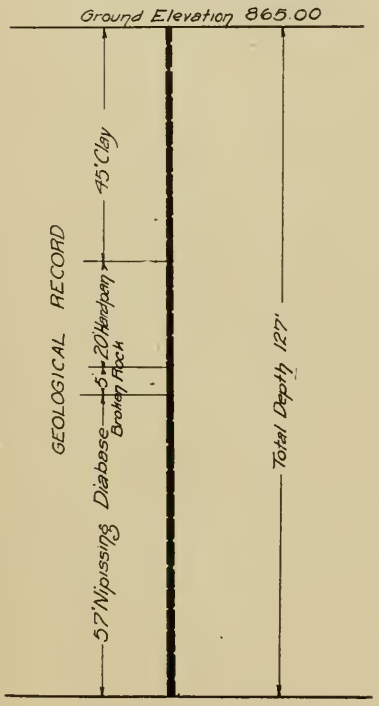
BORINGS BY ARTHUR CAMPBELL IN THE VICINITY OF NEW LISKEARD.

Name of Owner.	Location of Well.	Material Passed Through.
P. J. Whallen	S. ½ of N. ½ Lot 1, Con. 5, Harris	Gravel 18′, limestone 132′ water 40′ from surface.
A. J. Whalen	S. ½ Lot 1, Con. 5, Harris	Gravel 9′, limestone 66′, water 10′ from surface.
W. Bone	E. pt. of S. ½ Lot 12, Con. 3, Dymond	60′ clay, 15′ sand, 65′ sandstone, water 35′ from surface.
S. McChessney	S. ½ Lot 1, Con. 3, Harris	61′ clay, 67′ sandstone, water 50′ from surface.
J. Gray	N. ½ Lot 12, Con. 3, Dymond	67′ clay, limestone 83′, water 53′ from surface.
A. Larkin	N. ½ of N. ½ Lot 1, Con. 5, Harris	9′ gravel, sand 141′, water 50′ from surface.
B. Huggins	N. ½ Lot 2, Con. 3, Harris	8′ gravel, sandstone 142′, water 33′ from surface.
A. Waugh	S. ½ Lot 12, Con. 4, Dymond	8′ clay, limestone 40′, sandstone 87′, water 16′ from surface.
W. R. Montgomery	N. ½ Lot 10, Con. 3, Dymond	67′ clay, 98′ sandstone, water 51′ from surface.
S. Willows	S. part Lots 11 & 12, Con. 3, Dymond	120′ clay and water on gravel 22′ from surface.
W. E. David	N. part Lot 11, Con. 2, Dymond	117′ clay, limestone 17′, water 16′ from surface.
Balls School House	N. ½ Lot 3, Con. 2, Harris	170′ grey limestone, water 38′ from surface.
A. J. Kennedy	S. ½ Lot 9, Con. 6, Dymond	104′ clay, 7′ gravel, 7′ limestone, water 16′ from surface.
J. Gibbons	S. ½ of S. ½ Lot 9, Con. 4, Dymond	90′ clay, blue limestone 60′, water 19′ from surface.
Joe Lachine	N. ½ Lot 10, Con. 6, Dymond	32′ clay, sandstone 146′, water 48′ from surface.
John Miller	N. ½ Lot 9, Con. 5, Dymond	100′ clay, 60′ grey limestone, water 53′ from surface.
P. Gannon	N. ½ Lot 11, Con. 5, Dymond	20′ clay, 60′ yellow stone.
D. D. Reynolds	S. ½ Lot 11, Con. 6, Dymond	10′ gravel, 120′ grey limestone, water 25′ from surface.
W. Leishman	N. ½ Lot 4, Con. 4, Dymond	214′ clay, 20′ quicksand, gravel 8′, flowing well, heavy flow.

T.& N.O.R

RECORD OF DEEP WELLS AT NORTH COBALT

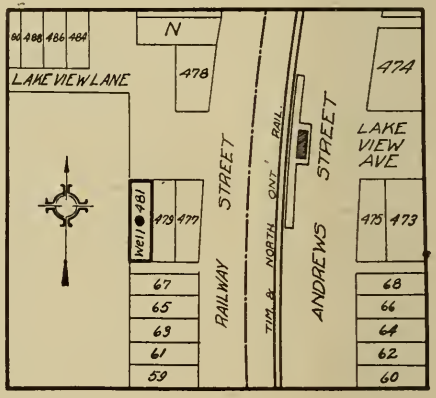
LOG OF WELL



LOCATION Lot #481

DATE BEGAN DRILLING Oct. 1914
WELL COMPLETED Oct. 1914.

NOTE:-
No water obtained-Casing withdrawn



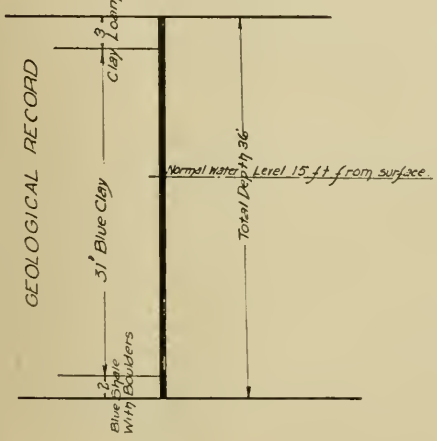
Office of Chief Engineer
North Bay. Ont. Dec. 14th 1914.

NIPISSING CENTRAL RLY

RECORD OF DEEP WELLS AT NORTH COBALT

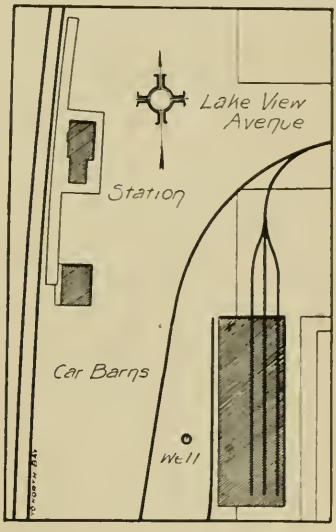
LOG OF WELL

Ground Elevation 865 00



LOCATION On west side of Car Barn

DATE BEGAN Drilling Dec 1913
WELL COMPLETED Dec 1913

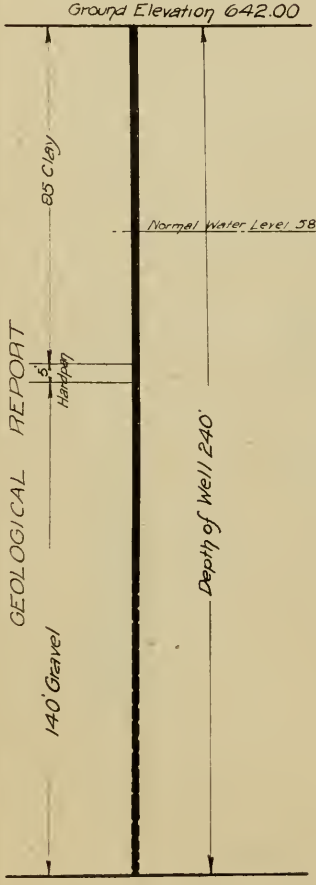


Office of Chief Engineer
North Bay Ont Dec 14th 1914

T&N O RLY
RECORD OF DEEP WELLS
AT NEW LISKEARD

LOG OF WELL

Ground Elevation 642.00

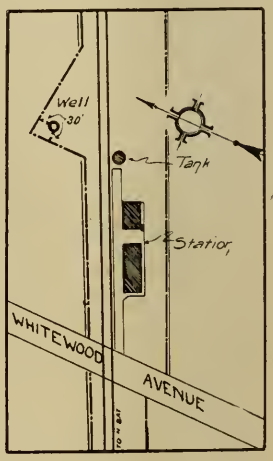


GEOLOGICAL REPORT

LOCATION In triangular Lot opposite Station

DATE BEGAN DRILLING Oct 13th 1914
WELL COMPLETED Nov 14th 1914

DELIVERY 55 gals per minute

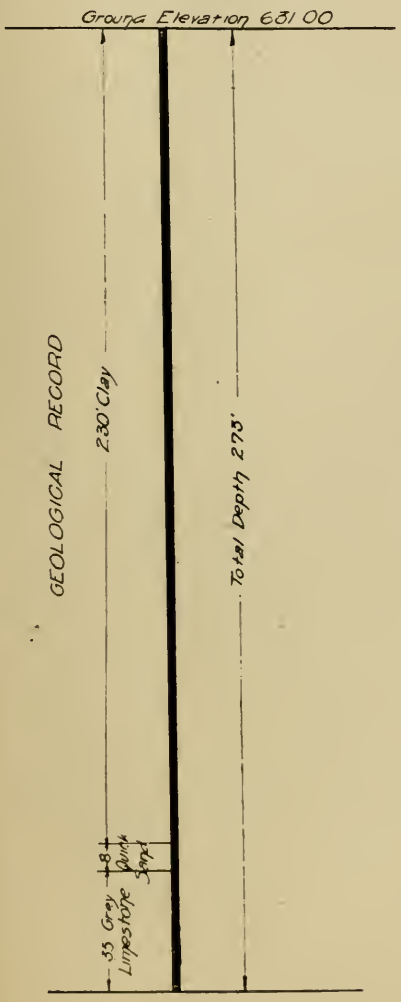


Office of Chief Engineer
North Bay Ont Dec 14th 1914

T. & N. O. R.

RECORD OF DEEP WELLS AT UNO PARK

LOG OF WELL

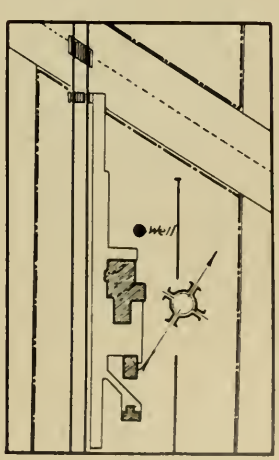


LOCATION - Uno Park.

DATE BEGAN DRILLING June 1914
WELL COMPLETED - June 1914

BACTERIOLOGICAL REPORT - Water does not show infection with harmful Bacteria

NOTE - This is an Artesian well with a flow of 6 gal per minute.



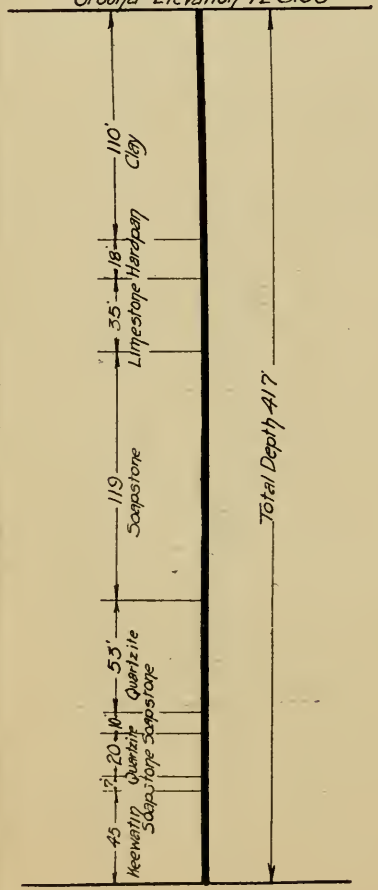
Office of Chief Engineer
North Bay Ont Dec 14th 1914

T&N O RLY.

RECORD OF DEEP WELLS AT HEASLIP

LOG OF WELL

Ground Elevation 728.00



LOCATION:- Well 20' north of Station
DATE BEGAN DRILLING Nov 9th 1914.
WELL COMPLETED Dec. 30th 1914
No water obtained

Office of Chief Engineer.
North Bay Ont Dec. 14th 1914

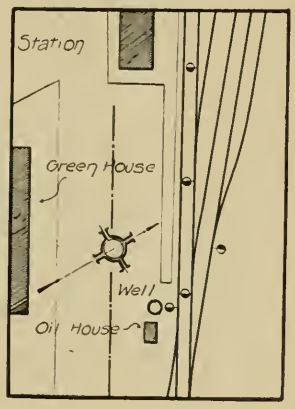
T & N O R Y

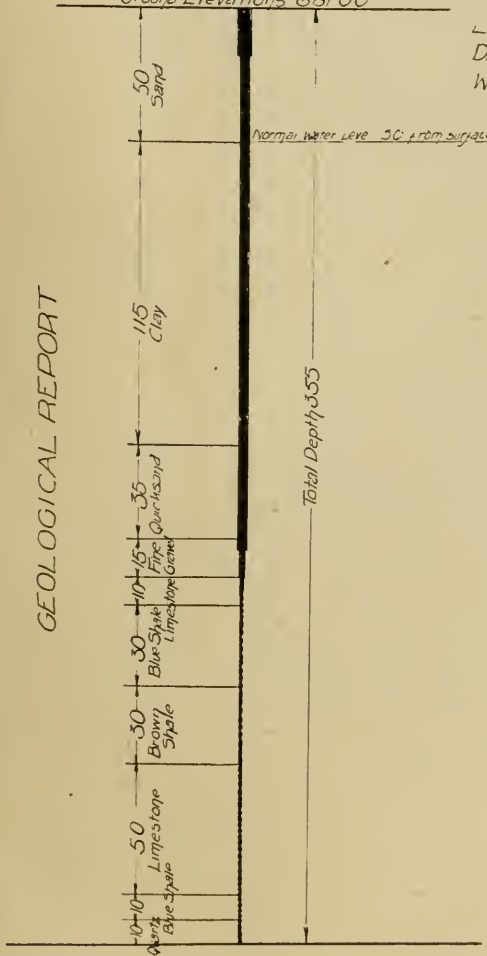
RECORD OF DEEP WELLS AT ENGLEHART WELL No. 1

LOG OF WELL

Ground Elevations 681.00

LOCATION - Under Steel Water Tower
DATE BEGAN DRILLING Nov 1907
WELL COMPLETED - Nov 1907





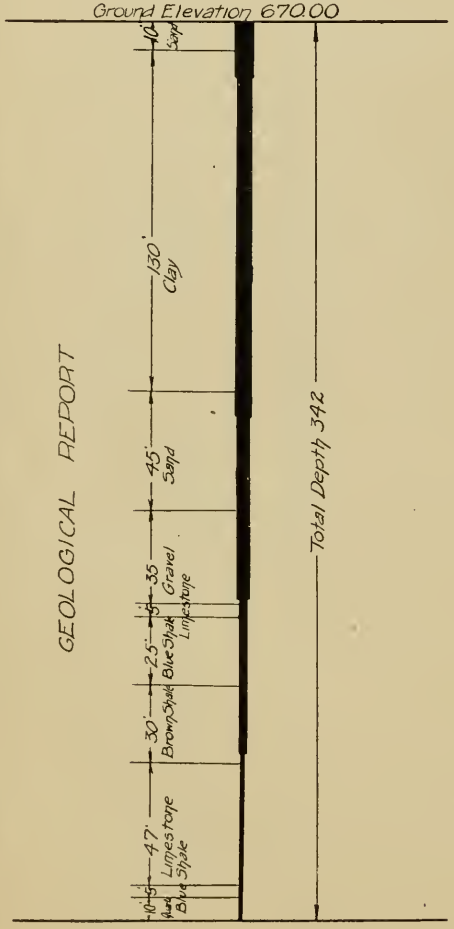
GEOLOGICAL REPORT

Office of Chief Engineer
North Bay Ont. Dec 14th 1914

T.&N.O.RLY.
RECORD OF DEEP WELLS
AT ENGLEHART
WELL No. 2

LOG OF WELL

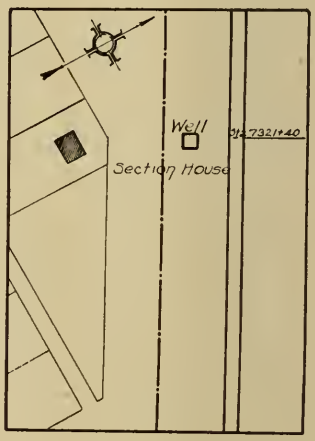
Ground Elevation 670.00



LOCATION:- On Prof W. 1005' N.W. of Station

DATE BEGAN DRILLING

WELL COMPLETED:-



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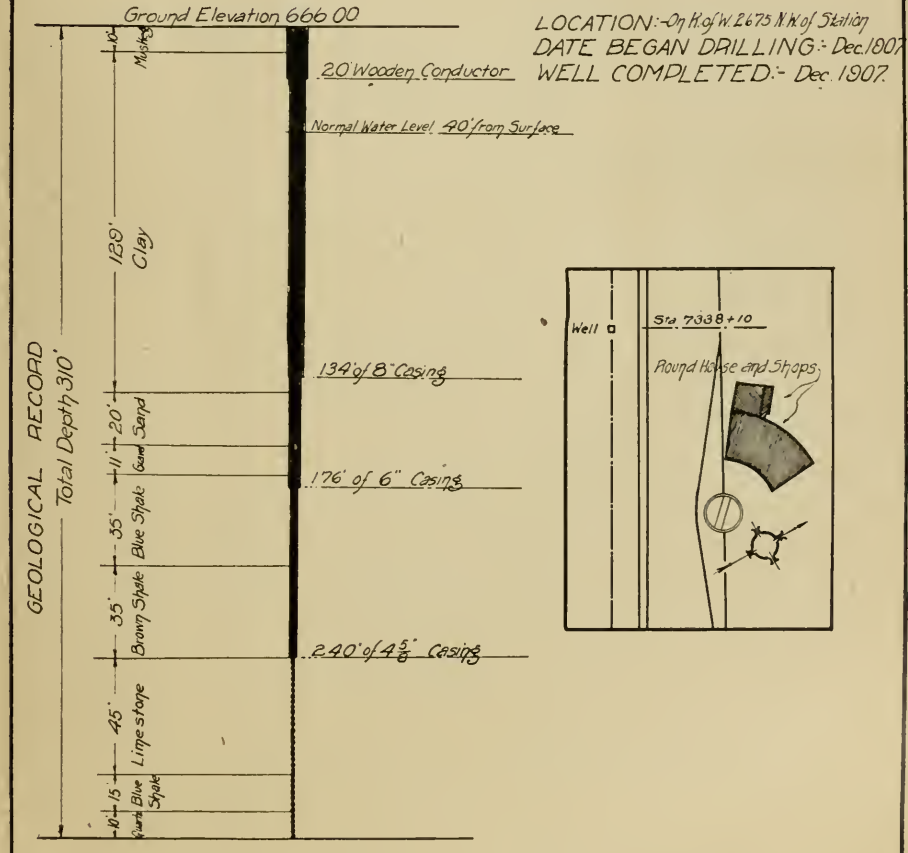
North Bay. Ont. Dec 14th 1914

T. & N. O. RLY.
RECORD OF DEEP WELLS
AT ENGLEHART
WELL No 3

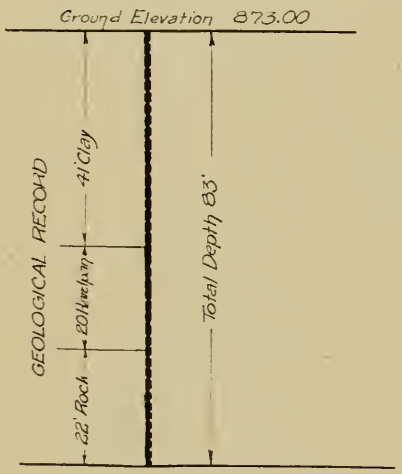


Office of Chief Engineer.
North Bay, Ont. Dec. 14th 1914.

T. & N. O. RLY.

RECORD OF DEEP WELLS AT MATHESON HOLE No 1

LOG OF WELL



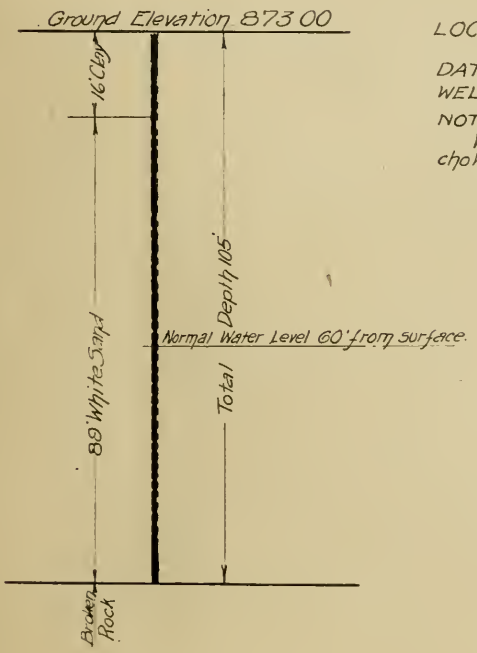
LOCATION:- South side of Through Siding East of East Leg of Wye.
DATE BEGAN DRILLING Sept. 20th 1913
WELL COMPLETED:- Oct. 2nd 1913
No water obtained:- Casing withdrawn

Office of Chief Engineer
North Bay Ont. Dec 14th 1914

T. & N. O. R.

RECORD OF DEEP WELLS AT MATHESON HOLE - No. 2.

LOG OF WELL



LOCATION:- Near tail of Wye

DATE BEGAN DRILLING:- Oct 3rd 1913
WELL COMPLETED:- Oct 10th 1913

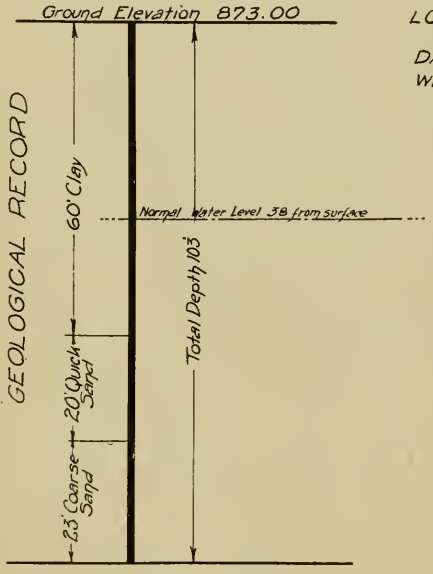
NOTE:-
Water obtained at 60 Level but well choked up by sand.
Well abandoned, Casing withdrawn

Office of Chief Engineer.
North Bay Ont. Dec. 14th 1914

T.& N.O.RLY

RECORD OF DEEP WELLS AT MATHESON WELL N°1 - HOLE N°4.

LOG OF WELL



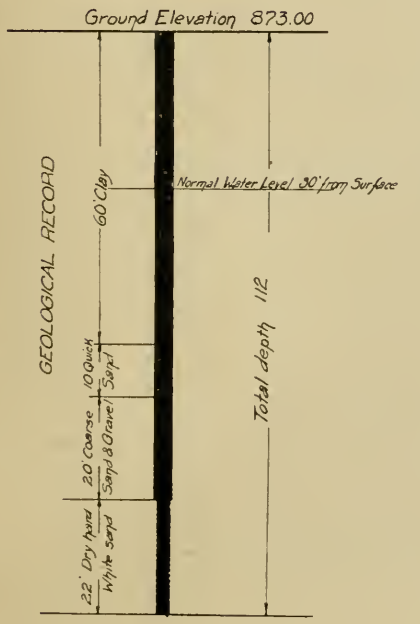
LOCATION: On station Grounds East of Section House
DATE BEGAN DRILLING:- Nov- 1913
WELL COMPLETED :- Nov- 1913.

Office of Chief Engineer
North Bay Ont. Dec. 14th/14

T.& N.O.R.

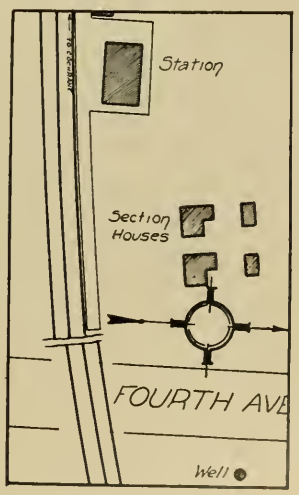
RECORD OF DEEP WELLS AT MATHESON WELL Nº2 HOLE Nº 5

LOG OF WELL



LOCATION - On Station Grounds East of road crossing.
DATE BEGAN DRILLING:- May 3rd 1914
WELL COMPLETED:- May 31st 1914
Delivery 30 Gals. per minute.

BACTERIOLOGICAL REPORT:-
Water does not show infection with harmful bacteria



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The Mining industry in that part of northern Ontario served by the Temiskaming and Northern Railway

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